Roads and Maritime Services/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Preliminary Draft Major Development Plan

Technical Working Paper 2

Noise and Vibration

November 2019

SYDNEY GATEWAY ROAD PROJECT

Road Technical Advisory and Environmental Advisory Services
Technical Working Paper 2 - Noise and Vibration

Prepared for:

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Gateway to Sydney Joint Venture (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Glossary

Item	Description / Definition
AADT	Annual Average Daily Traffic
Acute	A road traffic noise level of ≥65 dBA during daytime or ≥60 dBA during the night-time
APU	Auxiliary Power Unit
ARTC	Australian Rail Track Corporation
At-property treatments	Treatment of individual receivers to mitigate internal noise levels. Includes building treatments and courtyard walls. Building treatments can include mechanical ventilation, glazing, window and door seals, sealing of vents and underfloor areas, etc
CEMP	Construction Environmental Management Plan
Closely spaced receivers	Receivers which are separated by less than 20 m
CNIS	Construction Noise Impact Statement
CNVMP	Construction Noise and Vibration Management Plan
CNVG	Construction Noise and Vibration Guideline
CoRTN	Calculation of Road Traffic Noise
Cumulative impacts	Impacts that, when considered together, are more substantial than or different from a single impact when assessed on its own
Cumulative limit	Relates to road traffic noise criteria. A total noise level that is 5 dB or more above the criteria in the *Noise Criteria Guideline*
dBA	Decibel, A-weighted
DEC	Department of Environment and Conservation (now EPA)
DECC	Department of Environment and Climate Change (now EPA)
DECCW	Department of Environment, Climate Change and Water (now EPA)
Detailed design	The stage of the project where elements are designed in detail, suitable for construction
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
High urban area	In highly urban situations the 600 m road traffic noise assessment area defined in the *Noise Criteria Guideline* is likely to include other significant non-project roads that dominate noise levels at nearby receivers. In this case the assessment areas may be reduced to the point where noise levels from the project contribute slightly less than half of the total noise
HNA	Highly Noise Affected. Relates to construction noise levels of ≥75 dBA and is the point above which there may be strong community reaction to construction noise levels
ICNG	Interim Construction Noise Guideline
Initial design height barrier	A noise barrier where two-thirds of receivers that qualify for consideration of noise mitigation and receive sufficient benefit from the noise barrier to no longer need at-property treatment
L_{Aeq}	The average noise level during a measurement period, such as the daytime or night-time
L_{AFmax}	The maximum noise level measured during a monitoring period, using 'fast' weighting

Item	Description / Definition
Low noise pavement	Low noise pavements have an emission level around 2 dB lower than dense graded asphalt
Maximum barrier height	The barrier height where there are no receivers behind the barrier that need at-property noise treatment other than those that are influenced by barrier end effects or noise from other non-project roads. Barrier heights above 8 m are generally not be considered reasonable to build
NATA	National Association of Testing Authorities
NCA	Noise Catchment Area
NCG	Noise Criteria Guideline
NMG	Noise Mitigation Guideline
NML	Noise Management Level
Noise intensive equipment	Construction equipment that is particularly noisy and causes annoyance. Includes items such as rockbreakers and concrete saws
NPfI	Noise Policy for Industry
NSW	New South Wales
OLS	Obstacle Limitation Surface
OOH	Out of Hours
OOHW	Out of Hours Work
Other sensitive receivers	Non-residential sensitive receivers, including hospitals, educational facilities, place of worship, child care centres, outdoor recreation areas, etc
PNTL	Project Noise Trigger Level
Project site	The area that would be directly affected by construction (also known as the construction footprint)
RBL	Rating Background Level. This is the background noise level measured at a particular location. The method for calculating the RBL is defined in the NSW *Noise Policy for Industry*
Realistic worst-case scenarios	Realistic worst-case construction scenarios have been developed to assess the potential impacts from the project. These scenarios are based on the noisiest items of equipment which would likely be required to complete the works
RING	Rail Infrastructure Noise Guideline
ROL	Road Occupancy Licence
RMS	Root Mean Square
RNP	Road Noise Policy
SEARs	Secretary's Environmental Assessment Requirements
Significant impact	Defined in the EPBC Act as an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.
SLR	SLR Consulting Australia Pty Ltd
SSI	State Significant Infrastructure
Standard construction hours	Monday to Friday 7 am to 6 pm and Saturdays from 8 am to 1 pm

Item	Description / Definition
Study area	The study area is defined as the wider area including and surrounding the project site, with the potential to be directly or indirectly affected by the project
SWL	Sound Power Level
Sydney Gateway	Sydney Gateway comprises a road and rail component, consisting of: • Road connections to Sydney Airport's domestic and international airport terminals from the Sydney motorway network at St Peters interchange (being delivered by Roads and Maritime) • Duplication of a three-kilometre long section of the Botany Rail Line (being delivered by ARTC).
Terminal 1	Sydney Airport's international terminal
Terminals 2/3	Sydney Airport's domestic terminals
TfNSW	Transport for NSW
Transition zone	The area either side of the physical transition point between road development types (eg new versus redeveloped roads)
Triggered receiver	A receiver which is above the appropriate noise criteria
VC	Vibration Criterion
VDV	Vibration Dose Value
Worst-case impacts and noise levels	The worst-case (ie highest) impacts or noise levels predicted in this report

1 Introduction

1.1 Overview

1.1.1 Sydney Gateway and the project

Sydney Kingsford Smith Airport (Sydney Airport) and Port Botany provide essential domestic and international connectivity for people and goods. Together they form a strategic centre, which is set to grow significantly over the next 20 years. To support this growth, employees, residents, visitors and businesses need reliable access to the airport and port, and efficient connections to Sydney's other strategic centres.

The NSW and Australian governments are making major investments in the transport network to achieve this vision. New road and freight rail options are being investigated to cater for the forecast growth in passengers and freight through Sydney Airport and Port Botany. Part of this solution is Sydney Gateway, which comprises the following road and rail projects:

- Sydney Gateway road project (the subject of this assessment)
- Botany Rail Duplication.

Sydney Gateway will expand and improve the road and freight rail networks to Sydney Airport and Port Botany to keep Sydney moving and growing. The Sydney Gateway road project forms part of the NSW Government's long-term strategy to invest in an integrated transport network and make journeys easier, safer and faster.

Roads and Maritime Services and Sydney Airport Corporation propose the Sydney Gateway road project (the project). It comprises new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's terminals and beyond. It involves constructing and operating new and upgraded sections of road connecting to the airport terminals, four new bridges over Alexandra Canal and other operational infrastructure and road connections.

The project and its location is shown on **Figure 1** and **Figure 2**.

1.1.2 Overview of approval requirements

The project is subject to approval under NSW and Commonwealth legislation. Parts of the project located on Commonwealth-owned land leased to Sydney Airport (Commonwealth land) are subject to the Commonwealth *Airports Act 1996* (the Airports Act). In accordance with the Airports Act, these parts of the project are major airport development. A major development plan (MDP), approved by the Australian Minister for Infrastructure, Transport and Regional Development, is required before a major airport development can be undertaken at a leased airport.

Parts of the project located on other land are deemed State significant infrastructure in accordance with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). As State significant infrastructure, these parts of the project require approval from the NSW Minister for Planning and Public Spaces. An environmental impact statement (EIS) is required to support the application for approval for State significant infrastructure under the EP&A Act.

A combined EIS and preliminary draft MDP is being prepared to:

- Support the application for approval of the project in accordance with NSW and Commonwealth legislative requirements
- Address the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the SEARs), issued on 15 February 2019
- Address the MDP requirements defined by section 91 of the Airports Act.

This report was prepared on behalf of Roads and Maritime and Sydney Airport Corporation to support the combined EIS/preliminary draft MDP.

Figure 1 The Project

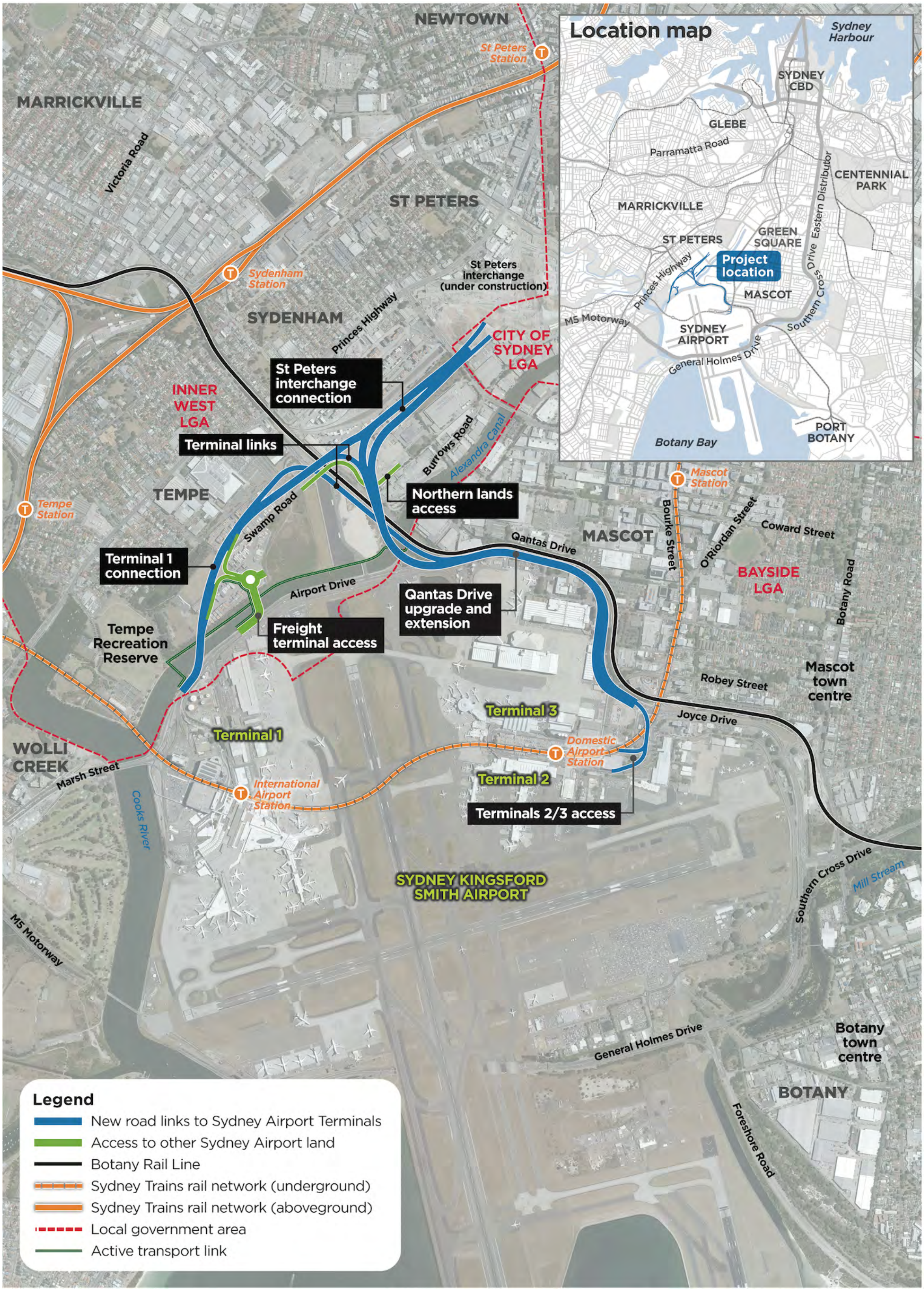
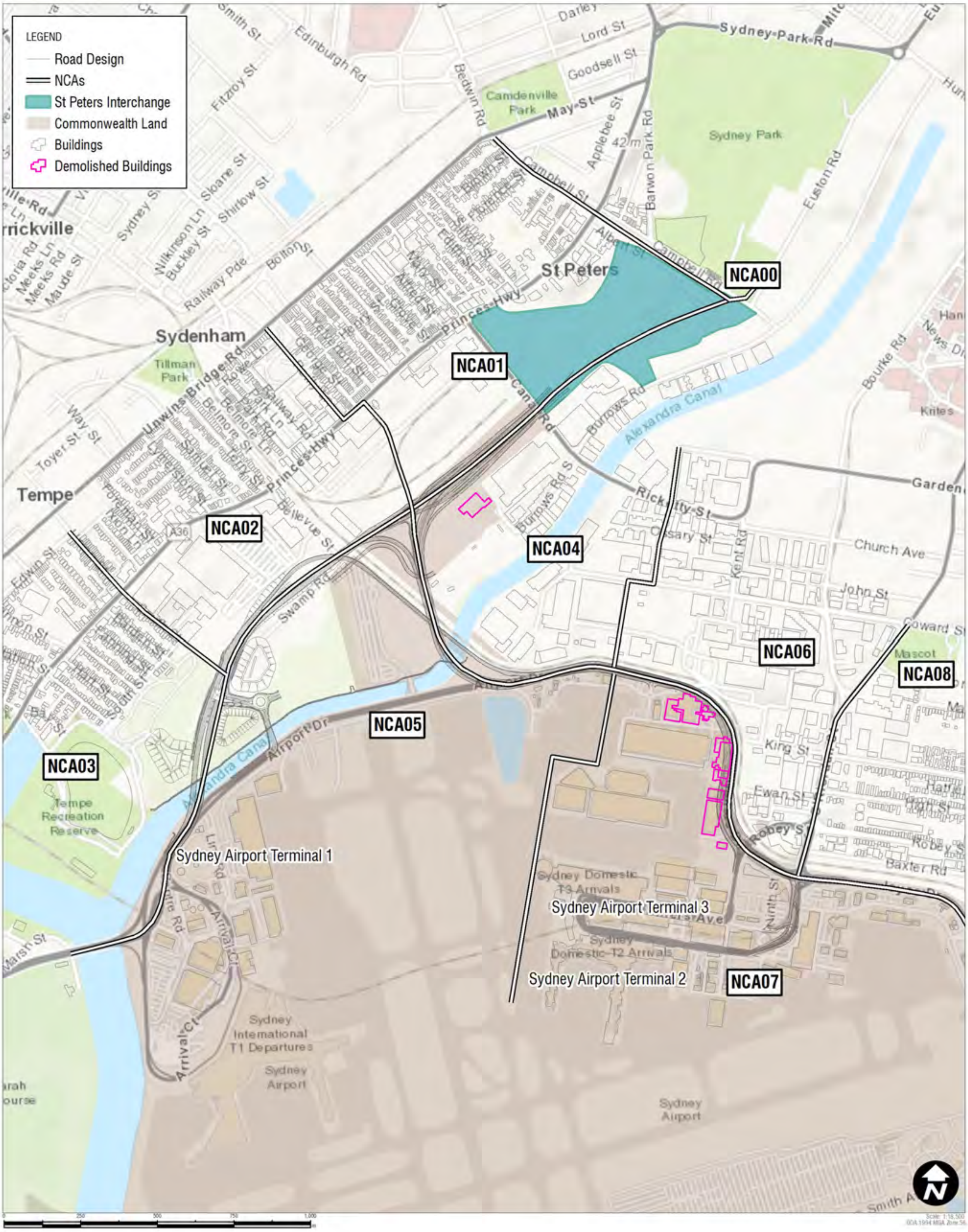


Figure 2 The Study Area and Noise Catchments



1.2 Purpose and Scope of this Report

This Noise and Vibration Technical Working Paper has been prepared to assess the potential noise and vibration impacts from construction and operation of the project on the nearby communities and sensitive receivers. The objectives of this report are to:

- Outline the method used in the noise and vibration assessment
- Describe the existing noise environment in the study area on the basis of unattended noise monitoring
- Identify the potentially sensitive receivers in the study area
- Describe the legislation and guidelines relevant to the assessment of the project
- Undertake detailed modelling to determine the potential noise and vibration impacts from the construction and operation of the project
- Evaluate the potential cumulative impact of the project with other nearby major infrastructure projects
- Where impacts are predicted, recommend appropriate measures to mitigate and manage the impacts.

The report addresses the relevant SEARs and the MDP requirements according to the Airports Act, as outlined in **Table 1** and **Table 2**.

Table 1 SEARs Relevant to this Assessment

Requirements	Where Addressed in this Report
Noise and Vibration – Amenity	
1. The Proponent must assess construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must consider cumulative impacts from nearby key infrastructure proposals and take into consideration and address the noise impacts arising from the redistribution of traffic (including on local feeder roads), and operational plant and equipment. The assessment must also include consideration of impacts to sensitive receivers and include consideration of sleep disturbance (including the number of noise-awakening events), and, as relevant, the characteristics of noise and vibration (for example, low frequency noise).	**Section 3.2** **Section 5** and **6** **Section 7** **Section 4.4.3** **Section 5**, **Section 5.9** and **Appendix D**

Requirements	Where Addressed in this Report
2. An assessment of construction noise and vibration impacts which must address:	
(a) the nature of construction activities (including transport, tonal or impulsive noise-generating works, as relevant);	**Section 4.1.1**
(b) the intensity and duration of noise (both air and ground borne) and vibration impacts. This must include consideration of extended construction impacts associated with ancillary facilities (and the like) and construction fatigue;	**Section 5, Table 28, Table 36, Section 7.1**
(c) the identification of receivers, existing and proposed, during the construction period;	**Figure 4, Figure 5**
(d) the nature of the impact and the sensitivity of receivers and level of impact;	**Section 5, Table 36**
(e) the need to balance timely conclusion of noise and vibration-generating works with periods of receiver respite, and other factors that may influence the timing and duration of construction activities (such as traffic management);	**Section 8.1**
(f) noise impacts of out-of-hours works (including utility works), possible locations where out-of-hours works would be undertaken, the activities that would be undertaken, the estimated duration of those activities and justification for these activities in terms of the *Interim Construction Noise Guideline* (DECCW, 2009);	**Section 5** **Section 4.1.1.1** **Table 26**
(g) a cumulative noise and vibration assessment inclusive of impacts from the proposal, including concurrent construction activities within the proposal and the construction of other relevant development in the vicinity of the proposal;	**Section 7.1**
(h) details and analysis of the predicted effectiveness of mitigation measures to adequately manage identified impacts, including impacts as identified in (g), and any potential residual noise and vibration impacts following application of mitigation measures; and	**Section 8.1**
(i) a description of how sensitive receiver feedback received during the preparation of the EIS has been taken into account (and would be taken into account post exhibition of the EIS) in the design of mitigation measures, including any tailored mitigation, management and communication strategies for sensitive receivers.	**Table 53**
3. The Proponent must demonstrate that blast impacts are capable of complying with the current guidelines, if blasting is required.	n/a – blasting not required
Noise and Vibration – Structural	
1. The Proponent must assess construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration of impacts to the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage), including cumulative impacts resulting from the Botany Rail Duplication	**Section 3.2** **Section 5** and **6** **Section 5.10.3** **Section 7**
2. The Proponent must demonstrate that blast impacts are capable of complying with the current guidelines, if blasting is required.	n/a – blasting not required

Table 2 MDP Requirements Relevant to this Assessment

Requirements	Where Addressed in this Report
91(1) A major development plan, or a draft of such a plan, must set out:	
(d) if a final master plan for the airport is in force—whether or not the development is consistent with the final master plan;	**Section 5.14** and **6.5**
(e) if the development could affect noise exposure levels at the airport—the effect that the development would be likely to have on those levels;	**Section 5.13** and **6.4**
(ea) if the development could affect flight paths at the airport—the effect that the development would be likely to have on those flight paths;	n/a
(h) the airport-lessee company's assessment of the environmental impacts that might reasonably be expected to be associated with the development;	**Section 5** and **6** **Section 5.13** and **6.4**
(j) the airport-lessee company's plans for dealing with the environmental impacts mentioned in paragraph (h) (including plans for ameliorating or preventing environmental impacts);	**Section 8**

1.3 The Project

1.3.1 Location

The project is located about eight kilometres south of Sydney's central business district and to the north of Sydney Airport on both sides of Alexandra Canal. The northern extent of the project is located at St Peters interchange, which is currently being constructed to the north of Canal Road in St Peters. The western extent of the project is located near the entrance to Sydney Airport Terminal 1 on Airport Drive, to the north of the Giovanni Brunetti Bridge and south-west of Link Road. The eastern extent of the project is located near the intersection of Joyce Drive, Qantas Drive, O'Riordan Street and Sir Reginald Ansett Drive.

The project is located mainly on government owned land in the suburbs of Tempe, St Peters and Mascot, in the Inner West, City of Sydney and Bayside local government areas.

1.3.2 Key Design Features

The project provides a number of linked road connections to improve the movement of traffic between the Sydney motorway network, Sydney Airport Terminal 1 (Terminal 1) and Sydney Airport Terminals 2 and 3 (Terminals 2/3). The project would connect Terminal 1 and Terminals 2/3 with each other and with the Sydney motorway network. The project would also improve the movement of traffic towards Port Botany via General Holmes Drive. It would provide three main routes for traffic:

- Between the Sydney motorway network and Terminal 1, and towards M5 motorway and Princes Highway
- Between the Sydney motorway network and Terminals 2/3, and towards General Holmes Drive, Port Botany and Southern Cross Drive
- Between Terminal 1 and Terminals 2/3.

The key features of the project include:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
  - St Peters interchange connection – a new elevated section of road extending from St Peters interchange to the Botany Rail Line, including an overpass over Canal Road
  - Terminal 1 connection – a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany Rail Line
  - Qantas Drive upgrade and extension – widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal
  - Terminal links – two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal
  - Terminals 2/3 access – a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive.
- Road links to provide access to Sydney Airport land:
  - A new section of road and an overpass connecting Sydney Airport's northern lands either side of the Botany Rail line (the northern lands access)
  - A new section of road, including a signalised intersection with the Terminal 1 connection and a bridge connecting Sydney Airport's existing and proposed freight facility either side of Alexandra Canal (the freight terminal access)
- An active transport link approximately 1.3 kilometres in length along the western side of Alexandra Canal to maintain connections between Sydney Airport, Mascot and the Sydney central business district
- Intersection upgrades or modifications
- Provision of operational ancillary infrastructure including maintenance bays, new and upgraded drainage infrastructure, signage and lighting, retaining walls, noise barriers, flood mitigation basin, utility works and landscaping.

1.3.3 Construction Overview

A conceptual construction methodology has been developed based on the preliminary project design to be used as a basis for the environmental assessment process. Detailed construction planning, including programming, work methodologies, staging and work sequencing would be undertaken once construction contractors have been engaged.

Timing and Work Phases

Construction of the project would involve four main phases of work. The indicative construction activities within each phase are outlined below.

Phase	Indicative Construction Activities
Enabling works	• construction of the temporary active transport link • modification of various road intersections to facilitate main construction works.
Site establishment	• installing site fencing, hoarding and signage • establishing construction compounds, work areas and site access routes.
Main construction works	• clearing/ trimming of vegetation • removal (or partial removal) of a number of buildings and other existing infrastructure eg concrete hardstand areas, drainage infrastructure, sheds, advertising structures, containers • roadworks, including bridge and viaduct construction and drainage works • utility works.
Finishing works	• erecting lighting, signage and street furniture, landscaping works and site demobilisation and rehabilitation in all areas.

Specific construction issues requiring careful planning and management and close co-ordination with relevant stakeholders include:

- Works within the prescribed airspace of Sydney Airport
- Works interfacing with the Botany Rail Line
- Piling in the vicinity of the T8 Airport and South line underground rail tunnels
- Works within the former Tempe Tip site and Alexandra Canal which are subject to remediation orders and specific management plans
- Excavation, storage and handling of contaminated soils generally within the project site and contaminated groundwater from the Botany Sands aquifer.

Construction is planned to start in mid 2020, subject to approval of the project, and is expected to take about three and a half years to complete. Further information on construction is provided in Chapter 8 (Construction) of the EIS.

The project would include work undertaken during recommended standard hours as defined by the *Interim Construction Noise Guideline* (DECC, 2009):

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sundays and public holidays: no work.

It would also include work outside these hours (out-of-hours work) to minimise the potential for aviation and rail safety hazards.

Construction Footprint

The land required to construct the project (the construction footprint) is shown on **Figure 3**. The construction footprint includes the land needed to construct the proposed roadways, bridges and ancillary infrastructure and land required for the proposed construction compounds. Utility works to support the project would generally occur within the construction footprint. However, some works (such as connections to existing infrastructure) may be required outside the footprint.

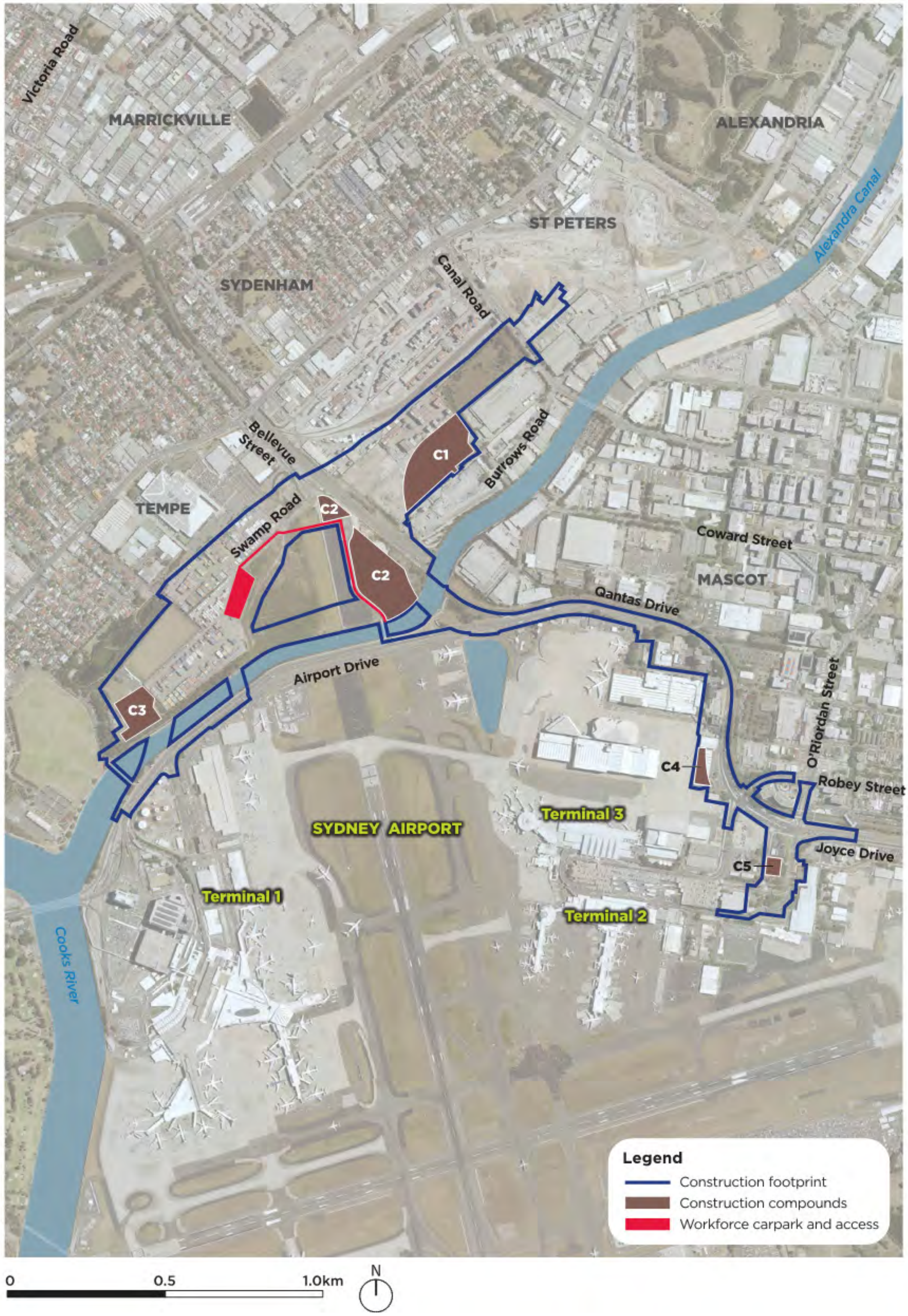
Compounds, Access and Resources

Construction would be supported by five construction compounds located to support the main construction works (shown on **Figure 3**). Construction compounds would include site offices, staff amenities, storage and laydown areas, workshops and workforce parking areas.

Materials would be transported to and from work areas via construction haul routes, which have been selected to convey vehicles directly to the nearest arterial road.

The construction workforce requirements would vary over the construction period based on the activities underway and the number of active work areas. The workforce is expected to peak at about 1,000 workers for a period of about 13 months, indicatively from the fourth quarter of 2021. Either side of this peak, workforce numbers are expected to reduce to about two thirds.

Figure 3 Construction Footprint and Facilities



1.4 Structure of this Report

The structure of the report is outlined below.

- **Section 1** – provides an introduction to the report
- **Section 2** – describes the existing environment as relevant to the assessment
- **Section 3** – defines the criteria relevant to the project
- **Section 4** – outlines the methodology used to predicted and assess the potential impacts
- **Section 5** – summarises the construction noise and vibration assessment
- **Section 6** – summarises the operational noise and vibration assessment
- **Section 7** – assesses the potential cumulative impacts from the project and other major projects
- **Section 8** – discusses the recommended mitigation for the project
- **Section 9** – provides a conclusion for the assessment.

1.5 Terminology

The assessment uses specific acoustic terminology and an explanation of common terms is included in **Appendix A**. A glossary is also at the start of this document which lists the various terms used.

2 Existing Environment

The project is located in the suburbs of Tempe, St Peters and Mascot and is close to a number of major existing road and rail transportation corridors, including Sydney Airport which is located generally to the south of the project.

Major roads in the study area include Princes Highway in the north, Airport Drive in the west, and Qantas Drive, Joyce Drive and O'Riordan Street in the east near to Sydney Airport Terminals 2/3. The Botany Rail Line runs through the study area and is a freight only line that connects Port Botany to the Sydney metropolitan rail network.

Existing noise levels in the study area are generally dominated by transportation noise, with road noise affecting most locations. Rail and aircraft noise also contribute to existing noise levels in certain areas, depending on the proximity to the Botany Rail Line and Sydney Airport. During the night-time, noise levels generally decrease due to reduced road traffic volumes on the surrounding road network. There is also a curfew on flights at Sydney Airport from 11 pm to 6 am.

The suburbs of Tempe and Mascot have large areas of suburban residential receivers, however, these are generally distant from the project site. The nearest residential receivers in Tempe are around 130 metres away from the project, to the north of Tempe Recreation Reserve. The nearest residential receivers in Mascot are around 90 metres to the north east, on Baxter Road.

Relatively large parts of the study area are of commercial or industrial use, especially around Sydney Airport, in the western section of Mascot near Alexandra Canal and along Princes Highway. The commercial uses include retail outlets, distribution warehouses, shipping container storage and areas of heavy industry, such as Boral Concrete St Peters and Boral Recycling St Peters which are located close to project site on Burrows Road South.

The assessment of impacts from the project uses a number of Noise Catchment Areas (NCAs) that reflect the land uses in the study area. These are shown in **Figure 4** and **Figure 5**, and described in **Table 3**. The areas of Commonwealth land are also shown in the figures.

Figure 4 Site Plan, Receivers and Noise Monitoring Locations – West

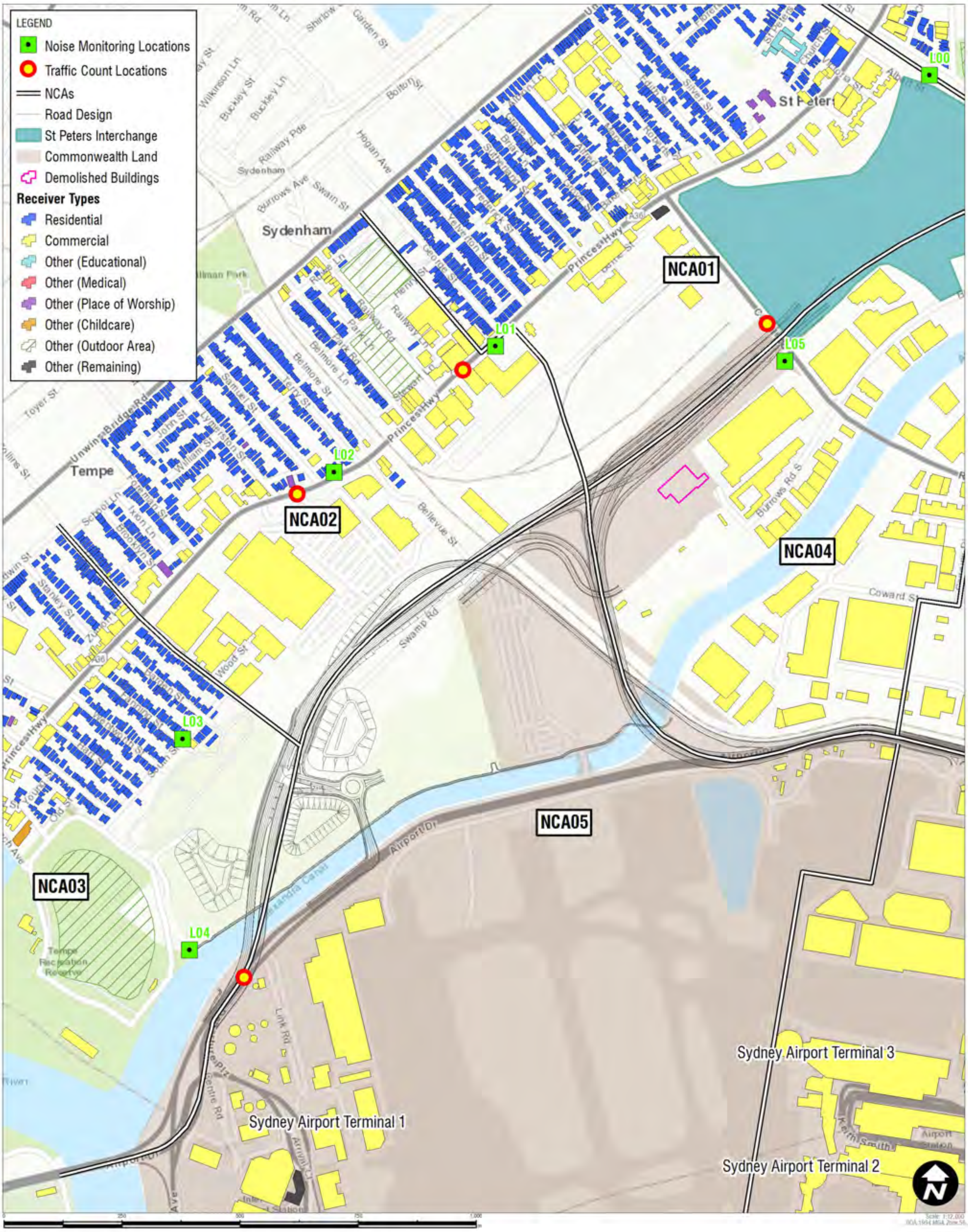


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Figure 5 Site Plan, Receivers and Noise Monitoring Locations – East

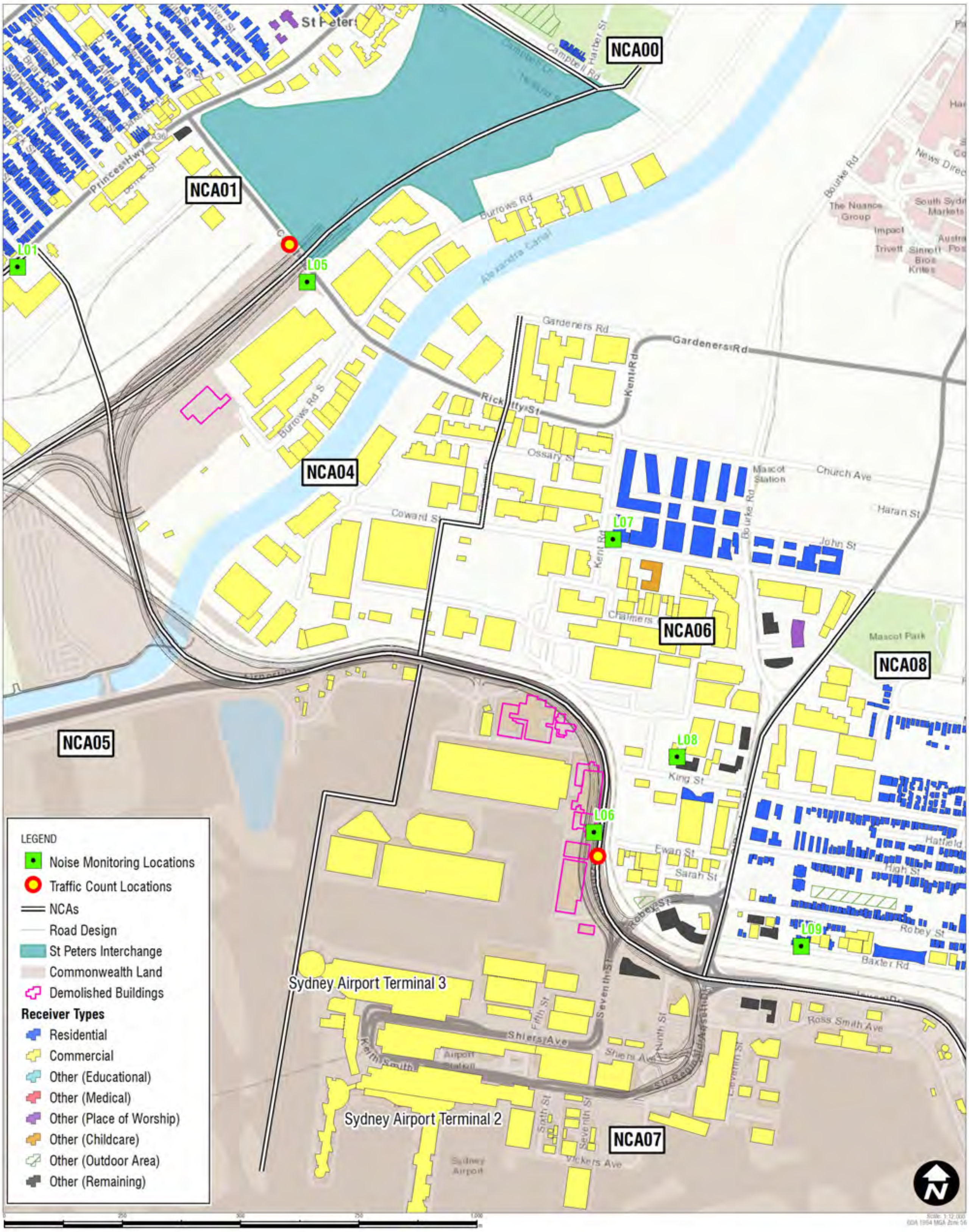


Table 3 Noise Catchment Areas and Surrounding Land Uses

NCA	Minimum Distance[1]	Description	Commonwealth Land?
NCA00	550 m	This catchment is located to the north east of St Peters interchange where construction of WestConnex New M5 is currently occurring. Residential receivers are located on Campbell Street/Road which face the interchange, however, they are relatively far from Sydney Gateway road project. Sydney Park is in this catchment, off Campbell Street.	-
NCA01	160 m	This catchment is located north of Alexandra Canal and east of Reilly Lane, Sydenham. It is mainly residential with the exception of commercial receivers along Princes Highway. St Peters Anglican Church, Public School and Preschool are in the north-east of the catchment. The closest receivers to the project are commercial receivers on Princes Highway.	Partly – southern boundary of the NCA
NCA02	5 m	This catchment is located in Tempe, north of Sydney Airport and Alexandra Canal. The southern section is mainly commercial and includes IKEA Tempe. The more distant area to the north of Princes Highway is mainly residential.	-
NCA03	130 m	This catchment is located in Tempe to the north-west of Sydney Airport Terminal 1. The catchment is mainly residential with the exception of commercial receivers on Princes Highway. The catchment includes Tempe Recreation Reserve and the Guardian Early Learning Child Care Centre.	-
NCA04	15 m	This catchment is north of Sydney Airport and Airport Drive and is entirely commercial. It includes Boral Concrete St Peters and Boral Recycling St Peters to the north Alexandra Canal. The nearest buildings are located close to the project site in the north and west of the catchment, and also along Airport Drive and Qantas Drive.	Partly – north-west and south sections near Alexandra Canal and Qantas Drive
NCA05	5 m	This catchment covers the western section of Sydney Airport and is generally commercial use associated with Sydney Airport Terminal 1.	Yes
NCA06	35 m	This catchment is located in Mascot to the north of Sydney Airport Terminals 2/3 and Qantas Drive. This catchment is mainly commercial with some distant residential receivers near Coward and Kent Street. There are a number of hotels along the eastern border on O'Riordan Street, including the Stamford Plaza Hotel.	Partly – Coleman Reserve and adjacent to Qantas Drive
NCA07	5 m	This catchment covers the eastern section of Sydney Airport and is generally of commercial use associated with Qantas and Sydney Airport Terminals 2/3. The project would remove a number of the buildings next to Qantas Drive. The catchment has a number of hotels near the Qantas Drive and O'Riordan Street intersection, including the Ibis Budget, Mantra Hotel and also a future hotel at Sydney Airport.	Yes
NCA08	85 m	This catchment is located in Mascot to the north-east of Sydney Airport. The area is mainly residential, with the nearest receivers being on Baxter Road. Two hotels, Quest Mascot and Citadines Connect Sydney Airport, are located near to O'Riordan Street. Mascot Public School is located in the north east of the catchment on King Street.	Partly – small section next to Joyce Drive

Note 1: Approximate minimum horizontal distance from project to nearest receiver in each NCA.

2.1 Noise and Vibration Sensitive Receivers

Receivers potentially sensitive to noise and vibration have been categorised as residential dwellings, commercial/industrial buildings, or ‘other sensitive’ land uses which includes educational institutions, child care centres, medical facilities, places of worship, outdoor recreation areas, etc. Receiver types and locations are shown in **Figure 4** and **Figure 5**.

The ‘other sensitive’ non-residential receivers identified in the study area are shown in **Table 4**.

Table 4 ‘Other Sensitive’ Receivers (Non-Residential)

NCA	Description	Address	Type	Common-wealth Land?
NCA00	Sydney Park	416 Sydney Park Road, Alexandria	Outdoor passive	-
NCA01	St Peters Public School	Church Street, St Peters	Educational	-
	St Peters Community Preschool	Church Street, St Peters	Educational	-
	St Peters Anglican Church	187 Princes Highway, St Peters	Place of worship	-
	Southern Cross Hotel	340 Princes Highway, St Peters	Hotel	-
NCA02	Uniting Church in Tempe	19 Lymerston Street, Tempe	Place of worship	-
	St Peter & St Paul Catholic Church	545 Princes Highway, Tempe	Place of worship	-
	True Buddhist Temple	645 Princes Highway, Tempe	Place of worship	-
	Sydenham Green	53 Railway Road, Sydenham	Outdoor passive	-
NCA03	Betty Spears Child Care Centre	1A Gannon Street, Tempe	Child care	-
	Al Hijrah Mosque	45 Station Street, Tempe	Place of worship	-
	Guardian Early Learning Centre	18 Holbeach Avenue, Tempe	Child care	-
	Mercure Sydney Int. Hotel	22 Levey Street, Wolli Creek	Hotel	-
	Tempe Recreation Reserve	Holbeach Avenue, Tempe	Outdoor active	-
NCA05	Rydges Sydney Airport	Sydney Airport, 8 Arrival Circuit, Mascot	Hotel	Yes
NCA06	Aero Kids Early Learning Centre	247 Coward Street, Mascot	Child care	-
	Citygate Fellowship Church	15 Bourke Road, Mascot	Place of worship	-
	Holiday Inn	Cnr of O'Riordan St & Bourke Rd, Mascot	Hotel	-
	Ibis Sydney Airport	205 O'Riordan Street, Mascot	Hotel	-
	Stamford Plaza Sydney Airport	Cnr of Robey St & O'Riordan St, Mascot	Hotel	-
	Adina Apartments	17 Bourke Road, Mascot	Hotel	-
	Toybox Early Learning[1]	15 Bourke Road, Mascot	Child care	-
	Travelodge	289 King Street, Mascot	Hotel	-
	Pullman Hotel	191 O'Riordan Street, Mascot	Hotel	-
	Coleman Reserve	4 Coleman Street, Mascot	Outdoor passive	Yes

NCA	Description	Address	Type	Common-wealth Land?
NCA07	Qantas Flight Training Centre	Off Qantas Drive	Educational	Yes
	Ibis Budget Sydney Airport	5 Ross Smith Avenue, Mascot	Hotel	Yes
	Mantra Hotel	3 Ross Smith Avenue, Mascot	Hotel	Yes
	Future airport hotel	Qantas Drive and Seventh Street, Mascot	Hotel	Yes
NCA08	Mascot Public School	207 King Street, Mascot	Educational	-
	Mascot Library	2 Hatfield Street, Mascot	Library	-
	The Branksome Hotel[1]	60 Robey Street, Mascot	Hotel	-
	Quest Mascot (Hotel)	108-114 Robey Street, Mascot	Hotel	-
	Citadines Connect Sydney Airport	121 Baxter Road, Mascot	Hotel	-
	Mascot Medical & Dental Centre	934-936 Botany Road, Mascot	Medical	-
	Robey Street Reserve	996 Botany Road, Mascot	Outdoor passive	-
	John Curtin Memorial Reserve	80-82 High Street, Mascot	Outdoor passive	-

Note 1: Where receivers of different use have been identified in the same building, the assessment applies the worst-case criteria for that building. Examples include Toybox Early Learning, which is in the same building as Adina Apartments; and The Branksome Hotel, which is in the same building as residential apartments.

2.2 Existing Noise Surveys and Monitoring Locations

Unattended noise monitoring was completed in the study area in September and October 2018. The measured noise levels have been used to determine the existing noise environment and to set the criteria used to assess the potential impacts from the project.

The measured existing noise levels are representative of receivers that would likely be most affected by the construction and operation of the project in each NCA. For NCAs that have receivers which are close to the project site, the monitoring equipment was located at front row receivers which would have line-of-sight to the project, within constraints such as accessibility, security and land owner permission.

The noise monitoring equipment continuously measured existing noise levels in 15-minute periods during the daytime, evening and night-time. All equipment carried current National Association of Testing Authorities (NATA) calibration certificates and calibration was checked before and after each measurement.

The results of the noise monitoring have been analysed to exclude noise from extraneous events and data affected by adverse weather conditions, such as strong wind or rain (measured at Sydney Airport), to establish representative existing noise levels for each NCA.

The noise monitoring locations are shown in **Figure 4** and **Figure 5**, and the results are summarised in **Table 5**. Details of each monitoring location together with graphs of the measured daily noise levels are provided in **Appendix B**.

Table 5 Summary of Unattended Noise Logging Results

ID	Address	Measured Noise Level (dBA)							
		Construction[1]						Operational[2]	
		Background Noise (RBL)			Average Noise (L_{Aeq})			Average Noise (L_{Aeq})	
		Day	Evening	Night	Day	Evening	Night	Day	Night
L00[3]	18 Campbell Street, St Peters	54	45	40	68	65	61	-[4]	-[4]
L01	Princes Highway, St Peters	65	62	53	75	74	72	75	72
L02	535 Princes Highway, Tempe	64	60	48	75	74	72	75	72
L03	1 Fanning Street, Tempe	42	40	38	61	60	53	-[4]	-[4]
L04	Alexandra Canal, Tempe	53	53 (56)[5]	46	64	64	58	64	58
L05	Canal Road, St Peters	58	54	49	67	65	63	66	63
L06	Qantas Drive, Mascot	63	60	52	73	72	70	72	70
L07	39 Kent Road, Botany	60	56	50	71	68	67	-[4]	-[4]
L08	289 King Street, Mascot	60	58	53	68	66	64	-[4]	-[4]
L09	105 Baxter Road, Mascot	54	51	45	67	65	62	-[4]	-[4]

Note 1: Construction noise is assessed during the daytime which is 7 am to 6 pm, the evening which is 6 pm to 10 pm and the night-time which is 10 pm to 7 am. See the NSW EPA *Interim Construction Noise Guideline*.

Note 2: Operational road traffic noise is assessed during the daytime which is 7 am to 10 pm and the night-time which is 10 pm to 7 am. See the NSW EPA *Road Noise Policy*.

Note 3: Results taken from location NL03 in the WestConnex New M5 EIS, Roads and Maritime 2015.

Note 4: Noise monitoring location only used to measure background noise levels for the construction assessment.

Note 5: The monitored evening level was found to be higher than the daytime, the NSW EPA *Noise Policy for Industry* therefore requires that the evening level be reduced to match the daytime level.

2.3 Attended Noise Measurements

Short-term attended noise monitoring was also completed at each monitoring location. The attended measurements allow the contributions of the various noise sources at each location to be determined. Detailed observations from the attended measurements are provided in **Appendix B**.

The attended measurements were generally found to be consistent with the results of the unattended noise monitoring and show that existing noise levels are typically dominated by transportation noise sources including road, rail and air, depending on location.

3 Legislative and Policy Context

3.1 Commonwealth Legislation

3.1.1 Airports Act 1996 and Associated Regulations

The project site includes areas of Commonwealth-owned land leased by Sydney Airport Corporation for the operation of Sydney Airport.

Section 89 of the Airports Act specifies types of development that constitute 'major airport development'. A major development plan (MDP) approved by the Australian Minister for Infrastructure and Transport is required before major airport development can be undertaken at a leased airport.

The Airports Act and regulations are the statutory controls for ongoing regulation of development activities on Commonwealth land leased from the Australian Government for the operation of Sydney Airport. Section 70 of the Airports Act requires there to be a final master plan for the airport that has been approved by the Australian Minister for Infrastructure and Transport.

Part 5 of the Act also requires that each airport develop an environment strategy which is included in its master plan. Once approved, Sydney Airport and all persons who carry out activities at the airport are obliged to take all reasonable steps to ensure compliance with the environment strategy.

The Airports Act does not contain specific assessment criteria for noise and vibration. The potential impacts from the project have therefore been assessed with reference to the limits in the Airports (Environment Protection) Regulations 1997 (see below) and against the relevant State legislation discussed in **Section 3.2**.

3.1.2 Airports (Environment Protection) Regulations 1997

The objective of the Airports (Environmental Protection) Regulations 1997 (the regulations) is to establish a system of regulation for activities at airports that generate or have potential to generate pollution or excessive noise. The regulations impose a general duty to prevent or minimise environmental pollution and have as one of their objects the promotion of improved environmental management practices at Commonwealth-leased airports. The regulations contain detailed provisions setting out:

- Definitions, acceptable limits and objectives for air, water and soil pollution, and offensive noise
- General duties to prevent or minimise pollution, preserve significant habitat and cultural areas, and to prevent offensive noise
- Monitoring and reporting requirements for existing pollution.

Part 2 of the regulations defines pollution in relation to air, water, soil and offensive noise. Schedules 1–4 of the regulations provide the acceptable limits of pollutants and offensive noise, which, in conjunction with other national environment protection measures, provide the system of environmental regulation at airports.

The parts of the regulation relating to offensive noise (Part 2, Division 2) and excessive noise (Schedule 4, Parts 2 and 3) are reproduced in **Appendix C.**

The regulations define **offensive noise** as noise that is, in the opinion of an airport environment officer, generated in a way that offensively intrudes on individual, community or commercial amenity. Various features of noise are to be considered when determining impacts including the receivers affected, the volume of the noise, the time of day it occurs, the duration and the existing background noise levels in the area.

Excessive noise limits are defined in the regulations for noise from construction works and operational road traffic as:

- Noise generated from construction, maintenance or demolition should not exceed 75 dBA $L_{A10(15minute)}$, calculated at the site of a sensitive receiver
- Noise generated from road traffic on the site of an operator of an undertaking at an airport should not exceed 60 dBA $L_{Aeq(24hour)}$ and 55 dBA $L_{Aeq(8hour)}$.

The 75 dBA $L_{A10(15minute)}$ airport regulations criterion for construction noise is similar in intent to the Highly Noise Affected criterion in the NSW EPA *Interim Construction Noise Guideline* (ICNG), which defines receivers as being Highly Noise Affected when $L_{Aeq(15minute)}$ noise levels are 75 dBA or greater (see **Table 7**). While it is acknowledged that the two criteria have different acoustic assessment parameters ($L_{A10(15minute)}$ vs $L_{Aeq(15minute)}$), the ICNG based Highly Noise Affected assessment is considered generally consistent with the airports regulations and has been used to assess the potential impacts from the project (see **Section 5.4**).

With regard to operational road traffic noise, the airport regulations criteria of 60 dBA $L_{Aeq(24hour)}$ and 55 dBA $L_{Aeq(8hour)}$ are less stringent than the NSW EPA *Road Noise Policy* (RNP) ‘new’ road criteria and are approximately comparable to the RNP ‘redeveloped’ road criteria (see **Table 11**), when the different time periods are taken into consideration. On this basis, the road traffic noise impacts from the project have been assessed against the requirements of the RNP (and Roads and Maritime *Noise Criteria Guideline*, which is Roads and Maritime’s interpretation of the RNP) (see **Section 6**).

The regulation defines **ground-based aircraft operations** as:

- Operation of an auxiliary power unit of an aircraft
- Ground-based aircraft running (ie test operation of an engine attached to an aircraft)
- Test-bed running of an aircraft engine removed from an aircraft.

There are no defined limits for ground-based aircraft operations in the regulations, however, they require potential impacts to be assessed in a similar subjective manner as for offensive noise.

The criteria used to assess the potential aircraft related ground-based noise impacts are provided in **Section 3.2.4**.

3.1.3 Sydney Airport Master Plan 2039 and Environment Strategy 2019-2039

3.1.3.1 Sydney Airport Master Plan 2039

As part of the planning framework established by the Airports Act, airport operators are required to prepare a master plan for the coordinated development of their airport.

Sydney Airport Master Plan 2039 (Master Plan 2039) outlines the strategic direction for Sydney Airport’s operations and development over the next 20 years. It acknowledges that the continued growth of Sydney Airport is vital to achieving local, state and national employment, tourism and development objectives. In accordance with the requirements of the Airports Act, Master Plan 2039:

- Establishes the strategic direction for efficient and economic development at Sydney Airport over the planning period
- Provides for the development of additional uses of the Sydney Airport site
- Indicates to the public the intended uses of the Sydney Airport site
- Reduces potential conflicts between uses of the Sydney Airport site, to ensure that uses of the site are compatible with the areas surrounding the airport
- Ensures that operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Establishes a framework for assessing compliance with relevant environmental legislation and standards
- Promotes continual improvement of environmental management at Sydney Airport.

The Master Plan 2039 does not contain any specific noise and vibration criteria, however, *Section 14.6.4 – Ground-based noise* does provide high level strategies relating to ground-based noise (which the Master Plan 2039 defines as including construction activities, operation of plant and equipment, taxiing aircraft, ground running of aircraft engines and operation of auxiliary power units), with the following key points:

- The Airports (Environmental Protection) Regulations 1997, discussed in **Section 3.1.2**, are referred to for guidelines regarding ground-based noise
- Engine ground running is regulated by an internal policy that aims to minimise noise impacts on areas surrounding the airport boundaries
- Ground-based noise from developments at the airport are to be assessed during the development approval process
- The 20-Year Response includes an initiative to carry out ground-based operational noise modelling for major developments.

Consistency with the Master Plan 2039 is discussed in **Section 5.14** for construction of the project and in **Section 6.5** for operation.

3.1.3.2 Sydney Airport Environment Strategy 2019–2024

The Airports Act requires that airport operators provide an assessment of the environmental issues associated with implementing the airport master plan and the plan for dealing with those issues. This is documented in an environment strategy that forms part of the airport's master plan.

The *Sydney Airport Environment Strategy 2019–2024* (the Environment Strategy), which forms part of Master Plan 2039, provides strategic direction for the environmental performance and management of Sydney Airport for the five year period between 2019 and 2024. The purpose of the Environment Strategy is to:

- Establish a framework for assessing compliance and ensuring that all operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Promote the continual improvement of environmental management and performance at Sydney Airport and build on the achievements and goals of previous strategies
- Realise improvements in environmental sustainability, by minimising Sydney Airport's environmental footprint and working towards a more efficient and resilient airport.

The Environmental Strategy also does not contain any specific noise and vibration criteria. *Section 3.5 – Ground-based Noise* does, however, include the following key points relevant to this assessment:

- Ground-based noise (defined in a similar manner to the Master Plan 2039) from new developments at the airport are assessed on an individual basis at the planning stages of each development
- Appropriate noise attenuation and mitigation measures are to be implemented where necessary
- Noise monitoring and modelling for individual projects is to be undertaken where necessary.

Consistency with the Environment Strategy is discussed in **Section 5.14** for construction of the project and **Section 6.5** for operation.

3.2 State Legislation and Guidelines

3.2.1 Environmental Planning and Assessment Act 1979

Parts of the project in State jurisdiction are declared State significant infrastructure. State significant infrastructure is regulated under the EPA Act, which requires proponents to apply to the NSW Minister of Planning for infrastructure approval, supported by an EIS.

The SEARs for the project define the matters to be addressed in the EIS, including the requirements for this Noise and Vibration Technical Working Paper.

3.2.2 Construction Noise and Vibration Guidelines

The State guidelines used to assess construction impacts from the project are listed in **Table 6**. The guidelines aim to protect the community and environment from excessive adverse noise and vibration impacts as projects are constructed.

Table 6 Construction Noise and Vibration Guidelines

Guideline/Policy Name	Where Guideline Used
Interim Construction Noise Guideline (ICNG) (DECC, 2009)	Assessment of airborne noise and ground-borne noise impacts on sensitive receivers
AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors	Provides recommended design sound levels for internal areas of occupied spaces
Road Noise Policy (RNP) (DECCW, 2011)	Assessment of construction traffic impacts
BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2, BSI, 1993	Assessment of vibration impacts (structural damage) to non-heritage sensitive structures
DIN 4150:Part 3-2016 Structural vibration – Effects of vibration on structures, Deutsches Institute fur Normung, 1999	Screening assessment of vibration impacts (structural damage) to heritage sensitive structures, where the structure is found to be unsound
Assessing Vibration: a technical guideline (DEC, 2006)	Assessment of vibration impacts on sensitive receivers
Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)	Assessment and management protocols for airborne noise, ground-borne noise and vibration impacts for road infrastructure projects

3.2.2.1 Interim Construction Noise Guideline

The NSW *Interim Construction Noise Guideline* (ICNG) is used to assess and manage impacts from construction noise on residences and other sensitive land uses in NSW.

The ICNG contains procedures for determining project specific Noise Management Levels (NMLs) for sensitive receivers based on the existing background noise in the area. The 'worst-case' noise levels from construction of a project are predicted and then compared to the NMLs in a 15 minute assessment period to determine the likely impact of the project.

The NMLs are not mandatory limits, however, where construction noise levels are predicted or measured to be above the NMLs, feasible and reasonable work practices to minimise noise emissions are to be investigated.

Residential Receivers

The ICNG approach for determining NMLs at residential receivers is shown in **Table 7**.

Table 7 ICNG NMLs for Residential Receivers

Time of Day	NML $L_{Aeq(15minute)}$	How to Apply
Standard Construction Hours Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	RBL[1] + 10 dB	• The noise affected level represents the point above which there may be some community reaction to noise • Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

	Highly Noise Affected
	75 dBA
		• The Highly Noise Affected (HNA) level represents the point above which there may be strong community reaction to noise
		• Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account:
		  ◦ Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid-morning or mid-afternoon for works near residences
		  ◦ If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Outside Standard Construction Hours	RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours • The proponent should apply all feasible and reasonable work practices to meet the noise affected level • Where all feasible and reasonable practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Note 1: The RBL is the Rating Background Level and the ICNG refers to the calculation procedures in the NSW *Industrial Noise Policy* (INP). The INP has been superseded by the NSW EPA *Noise Policy for Industry* (NPfI).

Works are recommended to be completed during Standard Construction Hours where possible. More stringent requirements are placed on works that are required to be completed outside Standard Construction Hours (ie during the evening or night-time) which reflects the greater sensitivity of communities to noise impacts during these periods.

Sleep Disturbance

Major infrastructure projects often require certain works to be completed during the night-time. Where night works are located close to residential receivers there is potential for sleep disturbance impacts.

The ICNG lists five categories of works that might be undertaken outside of Standard Construction Hours:

- The **delivery of oversized equipment or structures** that require special arrangements to transport on public roads
- **Emergency work** to avoid the loss of life or damage to property, or to prevent environmental harm
- **Maintenance and repair of public infrastructure** where disruption to essential services or considerations of worker safety do not allow work within standard hours
- **Public infrastructure works** that shorten the length of the project and are supported by the affected community
- Works where a proponent demonstrates and justifies **a need to operate outside the recommended standard hours**.

Where construction works are planned to extend over more than two consecutive nights, the ICNG recommends that an assessment of sleep disturbance impacts should be completed. The ICNG refers to the NSW *Environmental Criteria for Road Traffic Noise* for assessing the potential impacts, which notes that to limit the level of sleep disturbance the L_1 level (or L_{Amax}) should not exceed the existing L_{90} noise level by more than 15 dB.

Summary of Residential NMLs

The residential NMLs for the project have been determined using the results from the unattended existing noise monitoring (see **Section 2**) and are shown in **Table 8**.

Table 8 Residential Receiver Construction Noise Management Levels

NCA	Representative Background Monitoring Location	Noise Management Level ($L_{Aeq(15minute)}$ – dBA)				Sleep Disturbance Screening Criteria (RBL +15 dB)
		Standard Construction (RBL +10 dB)	Out of Hours (RBL +5 dB)			
		Daytime	Daytime[1]	Evening	Night-time	
NCA00	L00	64	59	50	45	55
NCA01	L01	75	70	67	58	68
NCA02	L02	74	69	65	53	63
NCA03	L03[2]	52	47	45	43	53
NCA04[3]	L05	68	63	59	54	64
NCA05[4]	L06	73	68	65	57	67
NCA06	L07[5]	70	65	61	55	65
NCA07[4]	L06	73	68	65	57	67
NCA08	L09	64	59	56	50	60

Note 1: Daytime out of hours is 7 am to 8 am and 1 pm to 6 pm on Saturday, and 8 am to 6 pm on Sunday and public holidays.

Note 2: NCA03 has two noise monitoring locations – L03 and L04. L03 has been used to set the NMLs for the catchment as it is located within the area of nearest residential receivers and is therefore considered representative of the background noise levels at these receivers. L03 also has lower background levels and results in more stringent criteria.

Note 3: NCA is of commercial use.

Note 4: NCA is Sydney Airport.

Note 5: NCA06 has two noise monitoring locations – L07 and L08. L07 has been used to set the NMLs for the catchment as it has lower background levels and results in more stringent criteria.

The noise monitoring locations were generally selected to measure background noise levels at the nearest front row receivers in each NCA. These locations would likely be most affected during construction of the project and while background noise levels may reduce for receivers which are further back from the works, construction noise generally reduces at a quicker rate than background noise level (from general road noise) with increasing distance. The worst-case noise impacts are therefore generally at the front row and control the mitigation requirements.

'Other Sensitive' Land Uses and Commercial Receivers

A number of non-residential land uses have been identified in the study area. These include 'other sensitive' land uses such as educational institutes, medical facilities, outdoor recreational areas and commercial properties. The ICNG NMLs for 'other sensitive' receivers are shown in **Table 9**.

Table 9 ICNG NMLs for 'Other Sensitive' Receivers

Land Use	Noise Management Level $L_{Aeq(15minute)}$ (Applied when the property is in use)
Classrooms at schools and other education institutions	Internal noise level 45 dBA[1]
Hospital wards and operating theatres	Internal noise level 45 dBA[1]
Places of Worship	Internal noise level 45 dBA[1]
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants)	External noise level 65 dBA

Land Use	Noise Management Level $L_{Aeq(15minute)}$ (Applied when the property is in use)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion)	External noise level 60 dBA
Community centres	Refer to the recommended 'maximum' internal levels in AS 2107 for specific uses
Commercial	External noise level 70 dBA

Note 1: The criteria is specified as an internal noise level for this receiver category. As the noise model predicts external noise levels, it has been conservatively assumed that all schools and places of worship have openable windows and external noise levels are 10 dB higher than the corresponding internal level, which is representative of windows being partially open to provide ventilation. Hospital wards are assumed to have fixed windows with 20 dB higher external levels.

The ICNG references *AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors* for criteria for 'other sensitive' receivers which are not listed in the guideline. The AS2107 NMLs for other sensitive receivers are shown in **Table 10**.

Table 10 AS2107 NMLs for 'Other Sensitive' Receivers

Use	Period	AS2107 Classification	Noise Management Level $L_{Aeq(15minute)}$
Hotel	Daytime and evening	Bars and lounges	Internal noise level 50 dBA[1]
	Night-time	Sleeping Areas: - Hotels near major road	Internal noise level 40 dBA[1]
Library	When in use	Reading areas	Internal noise level 45 dBA[1]

Note 1: These receivers are assumed to have fixed windows with a conservative 20 dB reduction for external to internal noise levels.

3.2.2.2 Construction Traffic Noise Guidelines

The potential impacts from construction traffic associated with the project when travelling on public roads are assessed under the NSW EPA *Road Noise Policy* (RNP) and Roads and Maritime *Construction Noise and Vibration Guideline* (CNVG).

An initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2.0 dB as a result of construction traffic from a project. Where this is considered likely, further assessment is required using the RNP and Roads and Maritime *Noise Criteria Guideline* (NCG) base criteria shown in **Table 11**.

Table 11 RNP/NCG Criteria for Assessing Construction Traffic on Public Roads

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq(15hour)}$ 60 (external)	$L_{Aeq(9hour)}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq(1hour)}$ 55 (external)	$L_{Aeq(1hour)}$ 50 (external)

3.2.2.3 Construction Ground-borne Noise Guidelines

Construction works can cause ground-borne noise impacts in nearby buildings when vibration generating equipment is in use. Vibration can be transmitted through the ground and into the structure of nearby buildings, which can then create audible noise impacts inside the building. The ICNG and CNVG provide evening and night-time ground-borne noise NMLs for residences to protect the amenity and sleep of affected residents. The ground-borne noise NMLs are:

- Evening $L_{Aeq(15minute)}$ 40 dBA
- Night-time $L_{Aeq(15minute)}$ 35 dBA.

For commercial receivers, the CNVG does not provide guidance in relation to acceptable ground-borne noise levels. An internal NML of 60 dBA has been used for these receivers, which is consistent with other similar infrastructure projects.

The NMLs only apply where internal ground-borne noise levels are higher than noise transmitted through the air. This situation can occur where buildings near to construction works have high performing facades which attenuate the airborne component, or where sensitive internal areas do not have facades which face the construction works.

3.2.2.4 Construction Vibration Guidelines

The effects of vibration from construction works can be divided into three categories:

- Those in which the occupants of buildings are disturbed (human comfort)
- Those where building contents may be affected (building contents)
- Those where the integrity of the building may be compromised (structural or cosmetic damage).

Human Comfort Vibration

People can sometimes perceive vibration impacts when vibration generating construction works are located close to occupied buildings.

Vibration from construction works tends to be intermittent in nature and the EPA's *Assessing Vibration: a technical guideline* (2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV). The 'preferred' and 'maximum' VDVs for human comfort impacts are shown in **Table 12**.

Table 12 Vibration Dose Values for Intermittent Vibration

Building Type	Assessment Period	Vibration Dose Value[1] ($m/s^{1.75}$)	
		Preferred	Maximum
Critical Working Areas (eg operating theatres or laboratories)	Day or night-time	0.10	0.20
Residential	Daytime	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	Day or night-time	0.40	0.80
Workshops	Day or night-time	0.80	1.60

Note 1: The VDV accumulates vibration energy over the daytime and night-time assessment periods, and is dependent on the level of vibration as well as the duration.

While the construction activities for this project are generally not expected to result in continuous or impulsive vibration impacts, it is noted that the construction activities are subject to refinement during detailed design. Continuous and impulsive criteria are shown in **Table 13**.

Table 13 Preferred and Maximum Weighted Root Mean Square Values for Continuous and Impulsive Vibration Acceleration (m/s^2) 1–80 Hz

Location	Assessment period	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration					
Critical working areas[1] (eg operating theatres or precision laboratories where sensitive operations are occurring)	Day or night-time	0.0050	0.0036	0.010	0.0072
Residential	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
Workshops	Day or night-time	0.04	0.029	0.080	0.058
Impulsive vibration					
Critical working areas[1] (eg operating theatres or precision laboratories where sensitive operations are occurring)	Day or night-time	0.0050	0.0036	0.010	0.0072
Residential	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

Note 1: No critical working areas have been identified in the study area. This should be confirmed during the detailed design stage.

Effects on Building Contents

People perceive vibration at levels well below those likely to cause damage to building contents. For most receivers, the human comfort vibration criteria are the most stringent and it is generally not necessary to set separate criteria for vibration effects on typical building contents.

Exceptions to this can occur when vibration sensitive equipment, such as electron microscopes, are located in buildings near to construction works. Criteria for vibration sensitive equipment are discussed in **Section 3.2.2.6**.

Structural and Cosmetic Damage Vibration

If vibration from construction works is sufficiently high it can cause damage to structural elements of affected buildings. The levels of vibration required to cause cosmetic damage tend to be at least an order of magnitude (10 times) higher than those at which people can perceive vibration.

Examples of damage that can occur includes cracks or loosening of drywall surfaces, cracks in supporting columns and loosening of joints. Structural damage vibration limits are contained in British Standard BS 7385 and German Standard DIN 4150.

BS 7385

British Standard BS 7385 recommends vibration limits for transient vibration judged to give a minimal risk of vibration induced damage to affected buildings. The limits for residential and industrial buildings are shown in **Table 14**.

Table 14 BS 7385 Transient Vibration Values for Minimal Risk of Damage

Group	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 1: Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%.

For heritage buildings, the standard states that *"a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive"*.

DIN 4150

German Standard DIN 4150 also provides guideline vibration limits for different buildings and buried pipework. Damage is not expected to occur where the values are complied with and the values are generally recognised to be conservative. The DIN 4150 values for buildings and structures are shown in **Table 15** with values for buried pipework in **Table 16**.

Table 15 DIN 4150 Guideline Values for Short-term Vibration on Structures

Group	Type of Structure	Guideline Values Vibration Velocity (mm/s)				
		Foundation, All Directions at a Frequency of			Topmost Floor, Horizontal	Floor Slabs, Vertical
		1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified as Group 1 or 2 **and** are of great intrinsic value (eg heritage listed buildings)	3	3 to 8	8 to 10	8	20[1]

Note 1: It may be necessary to lower the relevant guideline value markedly to prevent minor damage.

Table 16 DIN 4150 Guideline Values for Short-term Vibration on Buried Pipework

Line	Pipe Material	Guideline Values Vibration Velocity at the Pipe (mm/s)
1	Steel, welded	100
2	Vitrified clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
3	Masonry, plastics	50

3.2.2.5 Heritage Items

Heritage buildings and structures should be considered on a case-by-case basis but as noted in BS 7385 should not be assumed to be more sensitive to vibration, unless structurally unsound. Where a heritage building is deemed to be sensitive, the more stringent DIN 4150 Group 3 guideline values in **Table 15** can be applied.

3.2.2.6 Sensitive Scientific and Medical Equipment

Some scientific equipment, such as electron microscopes and microelectronics manufacturing equipment, can require stringent vibration goals.

Where vibration sensitive equipment is potentially affected by construction works, vibration limits for the operation of the equipment should be taken from manufacturer's data. Where this is not available the generic Vibration Criterion (VC) curves in **Table 17** can be used.

Table 17 VC Curves for Vibration Sensitive Equipment

Criterion Curve	Max Level (µm/sec, rms)[1]	Detail Size (microns)[2]	Description of Use
VC-A	50	8	Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc.
VC-B	25	3	An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment (including steppers) to 3 micron line widths.
VC-C	12.5	1	A good standard for most lithography and inspection equipment to 1 micron detail size.
VC-D	6	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems, operating to the limits of their capability.
VC-E	3	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems requiring extraordinary dynamic stability.

Note: Vibration Criterion curves as published by the Society of Photo-Optical Instrumentation Engineers (Colin G. Gordon – 28 September 1999).

3.2.2.7 Minimum Working Distances for Vibration Intensive Works

Minimum working distances for typical vibration intensive construction equipment are provided in the CNVG and are shown in **Table 18**. The minimum working distances are for both cosmetic damage (from BS 7385 and DIN 4150) and human comfort (from the NSW EPA Vibration Guideline). They are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.

Table 18 Recommended Minimum Working Distances from Vibration Intensive Equipment

Plant Item	Rating/Description	Minimum Distance		
		Cosmetic Damage		Human Response (NSW EPA Guideline)
		Residential and Light Commercial (BS 7385)	Heritage Items (DIN 4150, Group 3)	
Vibratory Roller	<50 kN (1–2 tonne)	5 m	11 m	15 m to 20 m
	<100 kN (2–4 tonne)	6 m	13 m	20 m
	<200 kN (4–6 tonne)	12 m	15 m	40 m
	<300 kN (7–13 tonne)	15 m	31 m	100 m
	>300 kN (13–18 tonne)	20 m	40 m	100 m
	>300 kN (>18 tonne)	25 m	50 m	100 m
Small Hydraulic Hammer	300 kg (5 to 12 t excavator)	2 m	5 m	7 m
Medium Hydraulic Hammer	900 kg (12 to 18 t excavator)	7 m	15 m	23 m
Large Hydraulic Hammer	1,600 kg (18 to 34 t excavator)	22 m	44 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	5 m to 40 m	20 m
Piling Rig – Bored	≤ 800 mm	2 m (nominal)	5 m	4 m
Jackhammer	Hand held	1 m (nominal)	3 m	2 m

The minimum working distances are indicative and will vary depending on the particular item of equipment and local geotechnical conditions. The distances apply to cosmetic damage of typical buildings under typical geotechnical conditions.

3.2.3 Operational Noise and Vibration Guidelines

The guidelines used to assess the potential operational road traffic impacts from the project are listed in **Table 19**. The guidelines aim to protect the community and environment from excessive noise and vibration impacts from the long-term operation of the project.

Table 19 Operational Road Traffic Noise and Vibration Guidelines

Guideline/Policy Name	When Guideline is Used
Road Noise Policy (RNP) (DECCW, 2011)	Operational road traffic noise assessment
Noise Criteria Guideline (NCG) (Roads and Maritime, 2015)	Defines Roads and Maritime's interpretation of the RNP and details how criteria is applied to sensitive receivers
Noise Mitigation Guideline (NMG) (Roads and Maritime, 2015)	Details how additional mitigation measures are to be applied to road infrastructure projects
Model Validation Guideline (Roads and Maritime, 2018)	Contains procedures for validating operational road traffic noise models
Environmental Noise Management Manual (ENMM) (Roads and Traffic Authority, 2001)	Additional information for operational road traffic noise assessment, including maximum noise assessments
Preparing an Operational and Construction Noise and Vibration Assessment Report (Roads and Maritime, 2016)	Defines how to complete operational road traffic noise and vibration assessments
AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors	Provides recommended design sound levels for internal areas of occupied spaces.
At-Receiver Noise Treatment Guideline (Roads and Maritime, 2017)	Provides an overview and discussion of feasible and reasonable at-receiver noise mitigation measures

3.2.3.1 Airborne Noise – Road Noise Policy and Noise Criteria Guideline

The NSW *Road Noise Policy* (RNP) is used to assess and manage potential airborne noise impact from new and redeveloped road projects.

This assessment is undertaken with guidance from the *Noise Criteria Guideline* (NCG) which is Roads and Maritime's interpretation of the RNP and provides a consistent approach to identifying road noise criteria for infrastructure projects.

The RNP and NCG provide non-mandatory criteria for residential and 'other sensitive' land uses. Where a project results in road traffic noise levels which are predicted to be above the criteria, the project should investigate feasible and reasonable noise mitigation measures to minimise the impacts.

The RNP and NCG use the following terms to describe and assess the impacts from road projects:

- '**No Build**' – the assessment scenario used to predict noise levels if the project were not to go ahead
- '**Build**' – the assessment scenario used to predict noise levels with the project.

The difference between the 'Build' and the 'No Build' noise levels is used to determine the impact of the project.

Residential Receivers

The project is a mixture of both 'redeveloped' roads and 'new' roads. A road is 'redeveloped' where works are in an existing road corridor and the existing road is not substantially realigned. Roads are classed as 'new' where the road construction is in an undeveloped corridor, where an existing road is substantially realigned or where the functional class of a road changes, such as where a road that was previously local becomes a larger collector road. The relevant noise criteria for residential receivers are shown in **Table 20**.

Table 20 NCG Criteria for Residential Receivers

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from **new** freeway/arterial/sub-arterial road corridors	$L_{Aeq(15\ hour)}$ 55 (external)	$L_{Aeq(9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from **redevelopment** of existing freeway/arterial/sub-arterial roads	$L_{Aeq(15\ hour)}$ 60 (external)	$L_{Aeq(9\ hour)}$ 55 (external)
	3. Existing residences affected by **additional traffic** on existing freeways/arterial/sub-arterial roads generated by land use developments		
	4. Existing residences affected by both new roads and the redevelopment of existing freeway/arterial/sub-arterial roads in a **transition zone**[1]	Between $L_{Aeq(15hour)}$ 55-60 (external)	Between $L_{Aeq(9hour)}$ 50-55 (external)
	5. Existing residences affected by increases in traffic noise of 12 dB or more from redevelopment of existing freeway/arterial/sub-arterial roads[2]	Between $L_{Aeq(15hour)}$ 42-55 (external)	Between $L_{Aeq(9hour)}$ 42-50 (external)
	6. Existing residences affected by increases in traffic noise of 12 dB or more from redevelopment of existing freeway/arterial/sub-arterial roads[2]	Between $L_{Aeq(15hour)}$ 42-60 (external)	Between $L_{Aeq(9hour)}$ 42-55 (external)
Local roads	7. Existing residences affected by noise from **new** local road corridors	$L_{Aeq(1\ hour)}$ 55 (external)	$L_{Aeq(1\ hour)}$ 50 (external)
	8. Existing residences affected by noise from **redevelopment** of existing local roads		
	9. Existing residences affected by **additional traffic** on existing local roads generated by land use developments		

Note 1: The criteria assigned to the entire residence depend on the proportion of noise coming from the new and redeveloped roads. Transition zones are discussed further in **Section 4.4.5**.

Note 2: The criteria at each facade are determined from the existing traffic noise level plus 12 dB.

The criteria are lower for the night-time due to the greater sensitivity of communities to noise impacts during this period.

The RNP and NCG require noise to be assessed at project opening and for a future design year, which is typically ten years after opening. For this project, the at-opening year is 2026 and the future design year is 2036.

The NCG requires transition zones to be applied at the point where road categories change to provide a smooth transition in noise criteria.

'Other Sensitive' Land Uses

A number of 'other sensitive' non-residential land uses have been identified in the study area. The noise criteria for these receivers are shown in **Table 21**. The NCG does not consider commercial and industrial receivers as being sensitive to operational airborne road traffic noise impacts.

Table 21 NCG Criteria for Other Sensitive Receivers

Existing Sensitive Land Use	Assessment Criteria (dB)		Additional Considerations
	Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)	
1. School classrooms	$L_{Aeq(1\ hour)}$ 40 (internal)[1]	-	In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the 'maximum' levels shown in Australian Standard 2107:2000 (Standards Australia 2000).
2. Hospital wards	$L_{Aeq(1\ hour)}$ 35 (internal)	$L_{Aeq(1\ hour)}$ 35 (internal)	
3. Places of worship	$L_{Aeq(1\ hour)}$ 40 (internal)[1]	$L_{Aeq(1\ hour)}$ 40 (internal)[1]	The criteria are internal, ie the inside of a church. Areas outside the place of worship, such as a churchyard or cemetery, may also be a place of worship. Therefore, in determining appropriate criteria for such external areas, it should be established what is in these areas that may be affected by road traffic noise.
4. Open space (active use	$L_{Aeq(15\ hour)}$ 60 (external)	-	Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
5. Open space (passive use)	$L_{Aeq(15\ hour)}$ 55 (external)	-	Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion (eg playing chess, reading).
6. Child care facilities	Sleeping rooms $L_{Aeq(1\ hour)}$ 35 (internal)[1] Indoor play areas $L_{Aeq(1\ hour)}$ 40 (internal)[1] Outdoor play areas $L_{Aeq(1\ hour)}$ 55 (internal)	-	Multipurpose spaces (eg shared indoor play/sleeping rooms) should meet the lower of the respective criteria. Measurements for sleeping rooms should be taken during designated sleeping times for the facility, or if these are not known, during the highest hourly traffic noise level during the opening hours of the facility.
7. Aged care facilities	-	-	The criteria for residential land uses should be applied to these facilities.

Note 1: The criteria are specified as an internal noise level for this receiver category. As the noise model predicts external noise levels, it has been conservatively assumed that all schools and places of worship have openable windows and external noise levels are 10 dB higher than the corresponding internal level, which is representative of windows being partially open to provide ventilation.

A number of hotels are located close to the project site. Certain hotels have staff who reside permanently on site and the NCG residential criteria have therefore been applied to these receivers, noting that only areas of permanent residence require assessment.

3.2.3.2 Potential Road Traffic Noise Impacts on the Surrounding Road Network

Where a project results in traffic redistribution, noise impacts can occur on the surrounding road network due to vehicles using different routes after the project is complete. The NCG criteria (see **Table 20**) are therefore to be applied to the surrounding road network where a road project generates an increase in road traffic noise of more than 2.0 dB.

3.2.3.3 Operational Vibration

Vehicles operating on roadways are unlikely to cause vibration impacts at adjacent receivers unless there are significant road irregularities, such as can occur at poorly maintained bridge joints. As the new and upgraded roads in the project site would be designed and constructed to avoid significant irregularities, impacts from operational vibration are not expected and have not been assessed any further.

3.2.4 Ground-based Airport Noise Guidelines

The project has the potential to alter ground-based noise from Sydney Airport. Noise from ground-based activities is made by a number of sources, including:

- Construction works
- Road traffic
- Taxiing aircraft
- Ground running of aircraft engines
- Operation of aircraft auxiliary power units (APUs).

Sydney Airport is on Commonwealth-land leased by Sydney Airport Corporation and the relevant noise emission requirements are contained in the Airports (Environmental Protection) Regulations 1997. The regulations do not contain specific criteria for ground-based airport noise but instead establish a system of regulation for activities that generate or have potential to generate excessive noise. Whether noise is excessive or not is generally determined by an airport environmental officer, with consideration of features such as the receivers which are affected, the volume of the noise, the time of day it occurs, the duration and the existing background noise levels in the area.

Noise from construction works and road traffic have been assessed against NSW guidelines which are summarised in **Section 3.2.1** and **Section 3.2.3**, respectively.

In the absence of any defined criteria relating to aircraft related ground-based noise, the NSW EPA *Noise Policy for Industry* (NPfI) has been referenced for the assessment of potential changes to aircraft related noise impacts, including engine ground running, as it contains the most appropriate criteria for assessing the potential impacts.

3.2.4.1 Noise Policy for Industry

The NPfI was released in 2017 and sets out the NSW Environment Protection Authority (EPA)'s requirements for the assessment and management of noise from industry in NSW.

Trigger Levels

The NPfI describes 'trigger levels' which indicate the noise level at which feasible and reasonable noise management measures should be considered. Two forms of noise criteria are provided – one to account for 'intrusive' noise impacts and one to protect the 'amenity' of particular land uses.

- The **intrusiveness** of an industrial noise source is generally considered acceptable if the L_{Aeq} noise level of the source, measured over a period of 15 minutes, does not exceed the background noise level by more than 5 dB. Intrusive noise levels are only applied to residential receivers. For other receiver types, only the amenity levels apply.
- To limit continual increases in noise levels from the use of the intrusiveness level alone, the ambient noise level within an area from all industrial sources should remain below the recommended **amenity** levels specified in the NPfI for that particular land use.

For potential aircraft related ground-based noise impacts near to the airport, the NPfI **intrusiveness** criterion is considered appropriate.

Project Specific Criteria

The intrusiveness based noise trigger levels for aircraft related ground-based noise from Sydney Airport are shown in **Table 22**.

The 'standard' triggers levels are provided for general aircraft related activities, such as taxiing. When engine run ups occur, they typically only last for a short period and where noisy events are not continuous, the NPfI allows adjustment of the trigger levels due to the infrequent nature of the noise. The criteria for 'engine run ups' has therefore been increased by 5 dB.

Table 22 Project Noise Trigger Levels – Aircraft Related Ground-based Noise

NCA	Period	Measured Noise Level (dBA)		Project Noise Trigger Levels $L_{Aeq(15minute)}$ (dBA)	
		RBL[1]	$L_{Aeq(period)}$	Standard	Engine Run Up[3]
NCA03 (L03)	Daytime	42	61	47	52
	Evening	40	60	45	50
	Night-time	38	53	43	48
NCA06 and NCA08 (L08)[2]	Daytime	60	68	65	70
	Evening	58	66	63	68
	Night-time	53	64	58	63

Note 1: RBL = Rating Background Level.

Note 2: The noise monitoring at this location was affected by nearby construction works during the monitoring period. The background levels and criteria for this area should be reviewed and confirmed during detailed design.

Note 3: Engine ground running would likely occur infrequently, especially during the night-time, and high power running would not occur every night.

The NPfI also contains amenity criteria for 'other sensitive' receivers and the relevant amenity noise levels for receivers that would potentially be affected by altered ground-based noise from Sydney Airport are provided in **Table 23**.

Table 23 NPfI Amenity Noise Levels for Other Sensitive Receivers

Receiver Type	Noise Amenity Area	Time of Day	Recommended Amenity Noise Level (dBA)	
			Standard[1]	Engine Run Up[2]
Hotel	Urban	Daytime	68 (60+5+3)	73
		Evening	58 (50+5+3)	63
		Night-time	53 (45+5+3)	58

Note 1: Set as being 5 dB above the recommend urban amenity noise level for a residence plus 3 dB to convert to a 15 minute level, as per the procedures in the NPfI.

Note 2: Engine ground running would likely occur infrequently, especially during the night-time, and high power running would not occur every night.

4 Methodology

4.1 Construction Airborne Noise Assessment Methodology

A noise model of the study area has been used to predict noise levels from the proposed construction works to all surrounding receivers. The model uses ISO 9613 algorithms in SoundPLAN software.

Local terrain, receiver buildings and structures were digitised in the noise model to develop a three-dimensional representation of the construction sites and surrounding areas.

4.1.1 Works Description

Representative scenarios have been developed to assess the likely impacts from the various construction phases of the project. These scenarios are shown in **Table 24** together with a high level description of each works activity. The location of the various work scenarios are shown in **Figure 6** and **Figure 7**.

The assessment uses 'realistic worst-case' scenarios to determine the impacts from the noisiest 15 minute period that are likely to occur for each work scenario, as required by the ICNG. The impacts represent construction noise levels without mitigation applied.

The scenarios have been categorised into 'Peak' and 'Typical' works. The 'Peak' works represent the noisiest stage of the works and can require noise intensive equipment such as rockbreakers or concrete saws. While 'Peak' works would be required at certain times in most locations, the highest noise impact works would only last for relatively short periods of the overall works duration. The 'Typical' works represent typical noise emissions from the project when noise intensive equipment is not in use.

The assessment is generally considered conservative as the calculations assume several items of construction equipment are in use at the same time within individual scenarios.

Construction works would also not occur continuously at each site and it is expected that there would be relatively long periods where construction noise levels are much lower than the realistic worst-case levels presented in this assessment. There would also be times when works are not audible at receivers due to less noisy items of equipment being used or where works are in distant parts of the project.

Table 24 Construction Scenario Descriptions

<table>
<tr><th>ID</th><th>Scenario[1,2]</th><th>Description</th></tr>
<tr><td>1a</td><td>Enabling Works (inc. utilities) – Peak</td><td rowspan="2">Enabling works would be required early on in the project to allow the main construction activities to occur. These works are expected to include:
• Northern pond – the Northern Pond is located at the intersection of Airport Drive and Qantas Drive. Enabling works may be required to perform modifications and construct a working platform over it to allow other works to occur.
• Utility relocation/protection – ground works to adjust, relocate or protect existing utilities and services. Utilities include:
Jemena gas mains; Ausgrid 33 kV Transmission Cables; Qenos 150 mm Ethylene Pipeline; Airport Communication Systems; Airport Fuel Pipelines; Sydney Desalination Pipeline; Airport Water Supply line; Communications infrastructure; Stormwater & drainage infrastructure
Noise intensive works would be required at certain times and could include the use of concrete saws, rockbreakers or pneumatic hammers, especially during the utility works when excavating existing road surfaces.</td></tr>
<tr><td>1b</td><td>Enabling Works (inc. utilities) – Typical</td></tr>
<tr><td>2a</td><td>Compound Establishment – Peak</td><td rowspan="2">Five major compounds would support the project. These are St Peters interchange connection compound, Eastern bridges compound, Western bridges compound, Qantas Drive compound, and Ninth Street compound. The main compounds would include site offices, workshops, laydown areas, worker amenities and workforce parking. A number of smaller compounds would also be used.
To establish the compounds, existing structures and vegetation would require removal and ground preparation activities would be carried out. Noise intensive works would be required at certain times during removal works and could include the use of concrete saws or rockbreakers. Vibratory rollers would also be required during ground preparation works.</td></tr>
<tr><td>2b</td><td>Compound Establishment – Typical</td></tr>
<tr><td>2c</td><td>Compound Operation</td><td>Operation of the compounds would include deliveries, storage of equipment and materials, and typical worker activities. Compound operation has no requirement for noise intensive equipment.</td></tr>
<tr><td>3a</td><td>Site Establishment</td><td>Before construction commences, the project site would need to be prepared to allow construction works to start. The works would vary depending on location and the existing conditions but could include:
• Removal of vegetation
• Erection of fencing, safe work barriers and hoarding
• Construction of access roads, as necessary
• Establishment of traffic, pedestrian and cyclist diversions
• Installation of safety and environmental controls
• General earthworks including landform creation
• Establishment of storage areas and parking areas.
Noise intensive works would not be expected to be required during these works. Vibratory rollers would be required during ground preparation works.</td></tr>
<tr><td>4a</td><td>Demolition – Peak</td><td rowspan="2">A number of existing buildings are within the project footprint. These buildings would be demolished to allow construction of the project. Most of the buildings to be demolished are adjacent to the new viaduct on Qantas Drive and are located at the Qantas Jet Base.
Noise intensive works would be required at certain times during demolition and would include the use of concrete saws, rockbreakers and pneumatic hammers.</td></tr>
<tr><td>4b</td><td>Demolition – Typical</td></tr>
</table>

ID	Scenario[1,2]	Description
5a	Bridge Works – Peak	The design includes several new bridges around Tempe and also a new viaduct from Qantas Drive to Sydney Airport Terminals 2/3. Bridge construction would likely include the following works: • Construct access ramps • Piling works and bridge foundations • Construct piling platforms or retaining walls • Construct piers and abutments • Installation of girders and fitout. Vibratory or percussive piling may be required, which can result in high noise impacts. Vibratory rollers would also be required during the works.
5b	Bridge Works – Typical	
6a	Road Works – Peak	Road works would be required along the entire road alignment. The majority of the roads in the project site would be new, however, widening of existing roads around Sydney Airport is also proposed. Road construction would include: • Ground works to excavate, backfill and compact formation layer • Laying road surface • Tie-ins to existing pavement. Noise intensive works would be required at certain times and would include the use of concrete saws. Vibratory rollers would also be required during the works. It is noted that *Road Works – Peak* would typically only be required where the project ties-in to existing infrastructure or where modification of existing infrastructure is required.
6b	Road Works – Typical	
6c	Road Works – Dynamic Compaction	Dynamic compaction is required around the former Tempe Tip site and involves dropping a large weight from height using a crane.
7a	Finishing Works	After the main construction works are complete, finishing works would be required which would include: • Installation of street furniture (ie lighting, safety barriers, etc) • Line marking • Installation of urban design treatments and features and landscaping works. Finishing works generally have no requirement for noise intensive equipment.

Note 1: Equipment lists for each scenario and Sound Power Level data are provided in **Appendix D**.

Note 2: The crushing and grinding area has been assessed separately in **Section 5.7**. Impact piling is assessed in **Section 5.8**.

The assessment in **Section 5** presents a summary of the predicted impacts from the above construction scenarios. To gain an understanding of the potential impacts from the project, detailed results are also provided for:

- The scenario with the predicted **worst-case impacts** (ie the highest predicted NML exceedances and most number of receivers affected)
- The scenario with the **longest duration**.

To give an overview of the likely impacts from the project, the assessment presents the impacts from the various construction scenarios assuming works are occurring at all locations at the same time. In reality, certain works would occur at discrete locations before moving on to the next area, which would limit the extent of impacts on nearby receivers. To simulate this, an additional scenario which models works in one location has been investigated.

Figure 6 Construction Works Locations – West

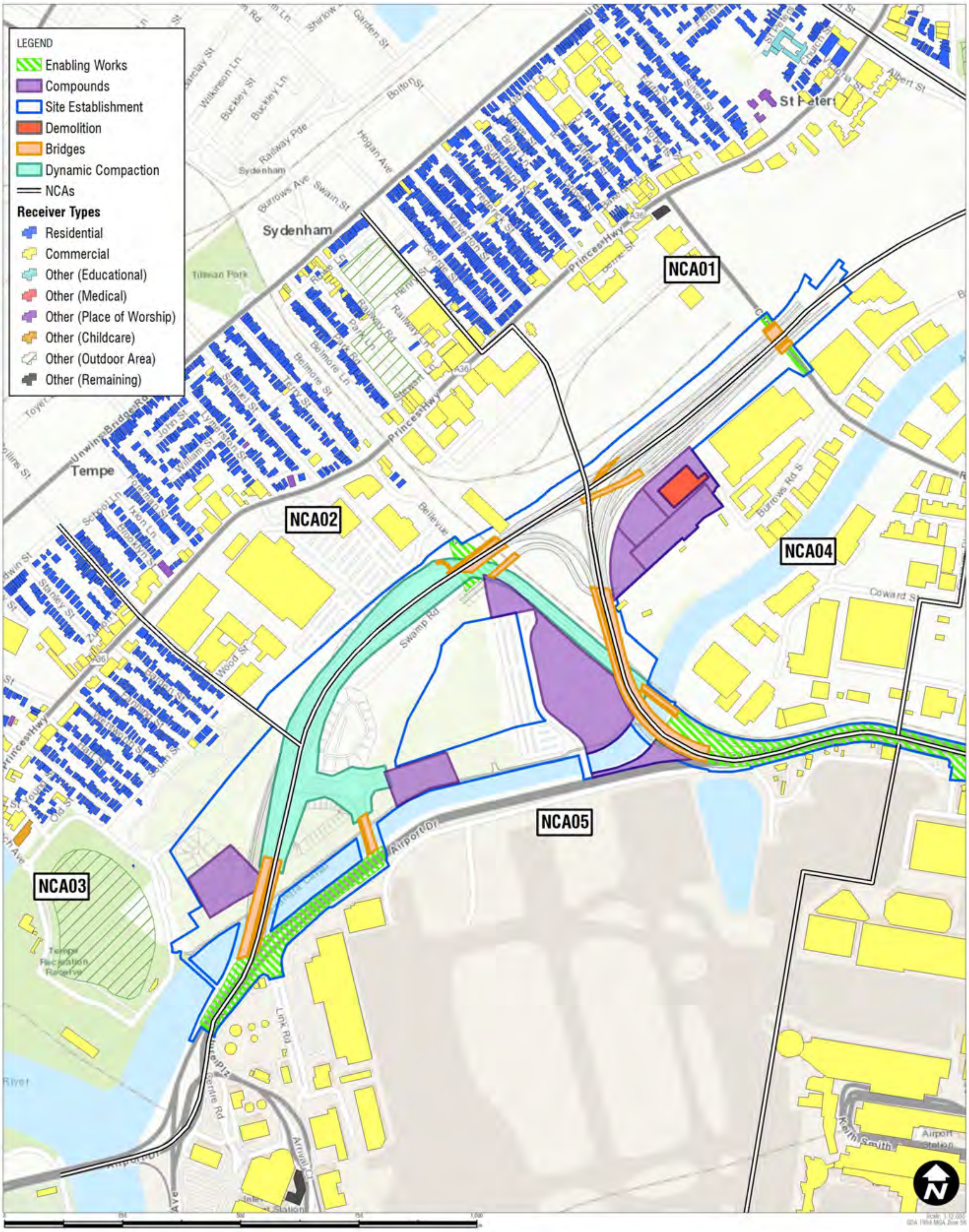


Figure 7 Construction Works Locations – East

4.1.1.1 Working Hours

Construction of the project would be carried out during ‘Standard Construction Hours’ where possible. Standard Construction Hours are defined in the ICNG and shown in **Table 25**.

Table 25 Standard Construction Hours[1]

Hour commencing	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Monday																								
Tuesday																								
Wednesday													Standard							OOH[3]				
Thursday				OOH									Construction Hours[2]							Period 1				
Friday				Period 2																Evening				
Saturday																								
Sunday													OOH[3] Period 1								OOH[3]			
Public Holiday													Day								Period 2			

Note 1: Taken from the TfNSW *Construction Noise and Vibration Strategy*.

Note 2: Standard Construction Hours are Monday to Friday 7 am to 6 pm and Saturdays from 8 am to 1 pm, as defined in the ICNG.

Note 3: OOH = Out of Hours (ie not during Standard Construction Hours).

However, the project specific constraints mean evening and night-time work would be required at certain times to minimise impacts on road and air traffic, and for safety reasons. Works would be required outside of Standard Construction Hours to:

- Minimise unacceptable traffic impacts on and disruptions to the road network
- Minimise disturbance to surrounding landowners and commercial properties
- Ensure the safety of the construction workers, motorists and the general public
- To avoid potential aviation safety impacts when construction activities associated with the project have the potential to intrude into prescribed airspace.

It is anticipated that the activities listed in **Table 26** would be required to be completed out of hours. Justification for these requirements is provided in the table.

Table 26 Works Outside of Standard Construction Hours

Activity	Justification for Out of Hours Activities
Maintenance	Maintenance for equipment may be on call for breakdowns and emergencies.
Road tie-in works, temporary diversions and traffic switches	Completing or installing these items at night when traffic flows are low would minimise disruption to traffic and minimise any potential safety conflict between construction personnel and traffic. It is noted that such works out of Standard Construction Hours are only required where there is a need to occupy trafficable parts of the road.
Pavement works, temporary medians and line marking	These works require lane closures and, in some cases, total closure of roads. Pavement works cannot be undertaken during periods of high traffic volumes and would be required to occur during evening and night-time periods to minimise disruption to local traffic.

Activity	Justification for Out of Hours Activities
Use of construction ancillary facilities to support out of hours works	Some activities at construction ancillary facilities would be required to support out of hours works. Where possible, activities would be kept to a minimum with only those required to support the works to be undertaken.
Delivery of oversized material, plant and equipment	Delivery of some materials and equipment may require oversized loads. Such activities would be undertaken in-line with NSW Police and Roads and Maritime requirements, which may include out of hours movements when vehicle numbers on the network are lower
Utility works	Some utilities are within road reserves. Occupation of lanes on these roads would be required to perform the work. Work would be undertaken in accordance with Roads and Maritime and local council requirements.
Craneage of bridge beams and precast deck units and piling of piers under the OLS	Certain work locations are below the obstacle limitation surface (OLS) that defines the prescribed airspace of the airport. Activities that would penetrate the OLS, such as the use of cranes to install bridge components and to assist with piling for bridge and retaining wall foundations, need to be done within the airport curfew (also outside Standard Construction Hours) to reduce potential hazards to aviation traffic.
Craneage of bridge beams and precast deck units under live traffic	Some bridge works might require locating a crane on or adjacent to roads or require large bridge components to be installed above live traffic. Such works may require lane occupancy or lane/road closure, which would be required outside Standard Construction Hours when traffic volumes are lower.

The periods in which the construction works are expected to be required are shown in **Table 27**. At this early stage in the project, Out of Hours Works (OOHWs) have been included in the assessment for most of the construction scenarios as they would likely require periods of evening or night-time works at some point during construction.

The expected durations of each scenario would vary depending on location. Estimates of the likely durations are provided in **Table 28**.

Table 27 Construction Scenarios – Working Hours

ID	Scenario	Activity	Hours of Works			
			Day	Day OOH[1]	Evening	Night-time
1a	Enabling Works (inc. utilities)	Peak	✓	✓	✓	✓
1b		Typical	✓	✓	✓	✓
2a	Compound Establishment	Peak	✓	✓	-	-
2b		Typical	✓	✓	-	-
2c	Compound Operation	-	✓	✓	✓	✓
3a	Site Establishment	-	✓	✓	✓	✓
4a	Demolition[2]	Peak	✓	✓	-	-
4b		Typical	✓	✓	-	-

ID	Scenario	Activity	Hours of Works			
5a	Bridges	Peak	✓	✓	✓	✓
5b		Typical	✓	✓	✓	✓
6a	Road Works	Peak	✓	✓	✓	✓
6b		Typical	✓	✓	✓	✓
6c		Dynamic Compaction	✓	✓	✓	✓
7a	Finishing Works		✓	✓	✓	✓

Note 1: OOH = out of hours. Daytime out of hours is Saturday between 7 am to 8 am and 1 pm to 6 pm, on Sunday and public holidays between 8 am to 6 pm.

Note 2: Occasional work during the night-time period may be required in some situations for these works.

Table 28 Construction Scenarios – Indicative Durations

ID	Scenario	Activity	Indicative Duration					
			Northern Lands[1]	Works around the Botany Rail Line[2]	Tempe Lands and Reserves	Airport Drive[3]	Qantas Drive[4]	T2/T3 Viaduct
1a	Enabling Works (inc. utilities)	Peak	6 months	2 months	2 months	3 months	3 months	6 months
1b		Typical	12 months	6 months	6 months	8 months	1 year	12 months
2a	Compound Establishment	Peak	1 months	-	1 month	-	-	1 month
2b		Typical	3 months	-	3 months	2 months	-	3 months
2c	Compound Operation	-	4 years	-	4 years	2.5 years	-	4 years
3a	Site Establishment	-	6 months	6 months	6 months	9 months	1 year	12 months
4a	Demolition	Peak	6 weeks	-	-	-	18 months	6 months
4b		Typical	6 weeks	-	-	-	18 month	6 months
5a	Bridges	Peak	6 months	12 months	9 months	18 months	-	6 months
5b		Typical	12 months	2 years	2 years	2.5 years	-	2.5 years
6a	Road Works	Peak	6 months	-	2 months	3 months	12 months	12 months
6b		Typical	3 years	1 year	2.5 years	1 year	18 months	2.5 years
6c		Dynamic Compaction	-	-	3 months	-	-	-
7a	Finishing Works		6 months	3 months	6 months	6 months	6 months	12 months

Note 1: From Canal Road to Botany Rail Line.

Note 2: Including the rail bridges and works around Swamp Road/ Bellevue Street.

Note 3: Including the abutments of all four bridges on the south-eastern side of Alexandra Canal.

Note 4: From the eastern extent of canal bridges to beginning of Sydney Airport Terminal 2/3 viaduct on ramp.

4.1.1.2 Works Schedule

Subject to planning approval, construction of the project is planned to start in the third quarter of 2020, with completion expected by the end of 2023. The indicative construction program is shown in **Table 29**.

Table 29 Indicative Construction Schedule

Work Phase	2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Enabling works																
Site establishment																
Main construction works																
Finishing and post construction rehabilitation																

4.2 Construction Vibration Assessment

The potential impacts during vibration intensive works have been assessed using the CNVG minimum working distances for cosmetic damage and human response shown in **Table 18**. The assessment identifies structures which are within the minimum working distances assuming a 13-18 tonne vibratory roller or a large rockbreaker are used in the project site during construction (see **Figure 6**, **Figure 7** and **Appendix D**).

4.3 Construction Mitigation

The ICNG acknowledges that due to the nature of construction works it is inevitable that there will be impacts where construction is near to sensitive receivers. There are a number of approaches used on major infrastructure projects to minimise the potential noise and vibration impacts as far as practicable.

Standard Mitigation Measures

The *Construction Noise and Vibration Guideline* (CNVG) contains a number of 'standard mitigation measures' for mitigating and managing noise and vibration impacts during construction of road infrastructure projects.

These standard measures include items such as requiring construction contractors to complete site inductions to make workers aware of any noise and vibration specifics on the project, completing regular monitoring to check noise and vibration levels are as expected, and checking noise emission levels from construction equipment to ensure they remain within manufacturers' specifications.

Additional Mitigation Measures

Where noise impacts remain after the use of 'standard mitigation measures', the CNVG requires 'additional mitigation measures' to be applied, where feasible and reasonable. The 'additional mitigation measures' are determined on the basis of the exceedance of the appropriate management levels and are shown in **Table 30**.

Table 30 CNVG 'Additional Mitigation Measures'

Additional Mitigation Measure	Description
Notification (letterbox drop or equivalent)	Advanced warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of five working days prior to the start of works.
Specific notifications (SN)	Specific notifications are letterbox dropped (or equivalent) to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. The specific notification provides additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops.
Phone calls (PC)	Phone calls detailing relevant information made to affected stakeholders within seven calendar days of proposed work. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.
Individual briefings (IB)	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.
Respite Offers (RO)	Respite Offers should be considered where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers. The purpose of such an offer is to provide residents with respite from an ongoing impact. This measure is evaluated on a project-by-project basis, and may not be applicable to all projects.
Respite Period 1 (R1)	Out of hours construction noise in 'out of hours period 1' shall be limited to no more than three consecutive evenings per week except where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and no more than six evenings per month.
Respite Period 2 (R2)	Night-time construction noise in 'out of hours period 2' shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and six nights per month. Where possible, high noise generating works shall be completed before 11pm.
Duration Respite (DR)	Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly. The project team should engage with the community where noise levels are expected to exceed the NML to demonstrate support for Duration Respite.
Alternative Accommodation (AA)	Alternative accommodation may be offered to residents living in close proximity to construction works that are likely to experience highly intrusive noise levels. The specifics of the offer should be identified on a project-by-project basis. Additional aspects for consideration shall include whether the highly intrusive activities occur throughout the night or before midnight.
Verification (V)	Verification of construction noise and vibration levels should occur to ensure the actual impacts are consistent with the predicted levels. Appendix F of the CNVG contains further details about verification of Noise and Vibration levels as part of routine checks of noise levels or following reasonable complaints.

4.4 Operational Noise Modelling Methodology

4.4.1 Key Operational Features of Project

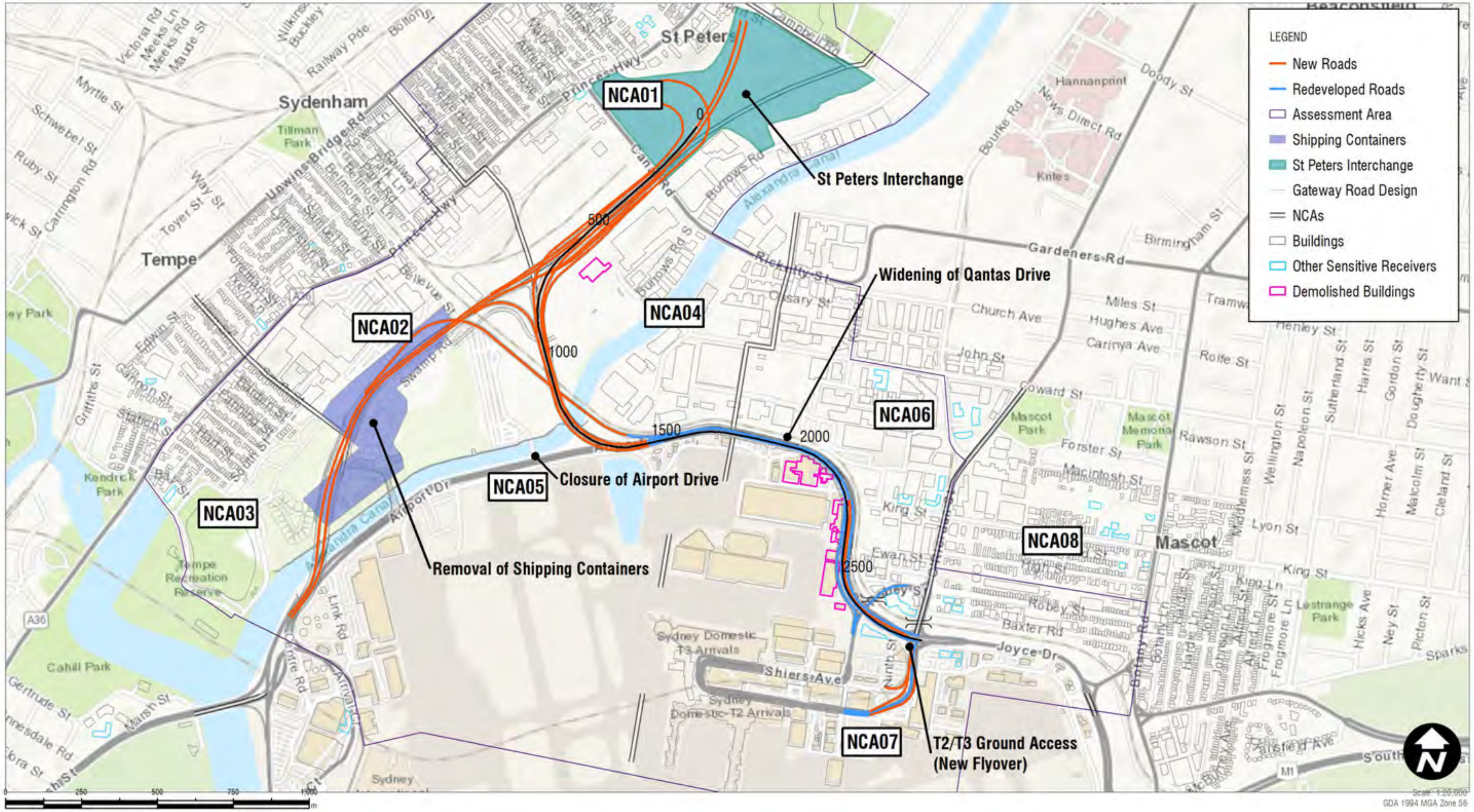
The key features of the project that have the potential to change operational noise impacts in the study area include:

- St Peters interchange connection – a new grade-separated section of road connecting St Peters interchange with Sydney Airport Terminal 1 and Terminals 2/3, via Qantas Drive and Airport Drive
- Upgrade and widening of Qantas Drive
- Terminals 2/3 access – a new grade-separated viaduct connection to Terminals 2/3 from the upgraded Qantas Drive
- Closure of Airport Drive with traffic being diverted around the new alignment
- Removal of shipping containers at Tyne Containers near Tempe Reserve, which currently provides some degree of noise shielding to residential receivers to the north
- Removal of a number of Sydney Airport buildings adjacent to Qantas Drive.

There is also potential for altered impacts on the surrounding roads due to redistribution of traffic that would result from the project.

The key features of the project are shown in **Figure 8**.

Figure 8 Key Features of the Project and Road Classification



SLR

4.4.2 Noise Model

A noise model of the study area has been used to predict noise levels from the operation of the project to all surrounding receivers. The model uses *Calculation of Road Traffic Noise* (CoRTN) (UK Department of Transport, 1988) algorithms in SoundPLAN software.

Local terrain, receiver buildings and structures were digitised in the noise model to develop a three-dimensional representation of the project site and surrounding areas.

The '**No Build**' scenarios use the existing road alignment geometry, with all existing structures and features within the road corridor being included.

The '**Build**' scenarios use the proposed design of the project, which includes all new roads, widening works, new bridges and changes to existing ground levels such as cuttings and embankments.

4.4.3 Project and Non-Project Roads

Roads where design or engineering changes are proposed as part of the project are considered as 'project' roads. Existing roads with no works are considered 'non-project'.

All major roads in the project site have been modelled together with major roads on the surrounding road network to determine the contributions from 'project' and 'non-project' roads at individual receivers, as required by the NCG.

Changes to traffic redistribution on the surrounding road network can result in altered noise impacts after a project is complete. The NCG criteria have been applied to the surrounding road network where an increase in road traffic noise of more than 2.0 dB is predicted.

'Project' and 'non-project' roads are shown in **Appendix E**.

4.4.4 Road Types

The NCG classifies project roads as either 'new' or 'redeveloped'. The road classifications used in the assessment are shown in **Figure 8**.

4.4.5 Assessment Area, Highly Urban Area and Transition Zones

The RNP defines the operational road traffic noise study area as being 600 metres from the centre line of the outermost trafficable lane on each side of the project alignment.

The NCG notes that in highly urban situations, such as the Sydney Gateway road project, the 600 metres area is likely to include other significant non-project roads, such as Princes Highway, that dominate noise levels at nearby receivers. In this case the assessment area may be reduced to the point where noise levels from the project contribute slightly less than half of the total noise. Using this approach, the assessment area for the project is shown in **Figure 8**.

The NCG also requires transition zones to be applied at the point where road categories change from 'new' to 'redeveloped' to provide a smooth transition in noise criteria. The transition zone for the assessment area is shown in **Appendix E**.

4.4.6 Traffic Data

The traffic data used in the noise modelling was supplied by the project team and is provided in **Appendix E**.

A number of other major road infrastructure projects are located near Sydney Gateway road project and have the potential to influence traffic volumes in the study area. To assess the potential impact from the combined effect of these projects an additional 'cumulative' modelling scenario has been investigated.

The projects which have been included in the various assessment scenarios are shown in **Table 31**. The traffic scenarios are:

- **Without project** – this scenario represents the existing road network in the study area in the absence of the project. The traffic data includes M4 East, New M5 and M4–M5 Link
- **With project** – this scenario assumes that the project goes ahead. The traffic data includes Sydney Gateway road project, M4 East, New M5 and M4–M5 Link
- **Cumulative** (ie with the project and other projects that interface, overlap or have potentially cumulative effects) – this scenario assumes that the project goes ahead. The traffic data includes Sydney Gateway road project, M4 East, New M5 and M4–M5 Link and other major interfacing projects that could be operational in the 2036 future design year.

Table 31 Traffic Scenarios and Interfacing Projects

Year	Assessment Scenario	Traffic Scenario	Mascot 'at-grade' works, Princes Highway/Railway Road Upgrade, Airport North and East Upgrade	NorthConnex, M4 East, New M5 and M4–M5 Link	Sydney Gateway road project	F6 Extension Stage 1	F6 Extension (Kogarah to Loftus)	Western Harbour Tunnel & Beaches Link
2026 At Opening	No Build	Without project	✓	✓	-	-	-	-
	Build	With project	✓	✓	✓	-	-	-
		Cumulative	✓	✓	✓	✓	-	-
2036 Future Design	No Build	Without project	✓	✓	-	-	-	-
	Build	With project	✓	✓	✓	-	-	-
		Cumulative	✓	✓	✓	✓	✓	✓

4.4.7 Noise Modelling Parameters

Further details on the noise modelling parameters used in the assessment are shown in **Table 32**.

Table 32 Summary of Noise Model Inputs and Parameters

Input Parameter	Source of Data
Ground topography	The noise model includes a 'digital ground model' which is an accurate 3D representation of the terrain in the study area. The ground model was constructed from a combination of surveyed road corridor data and LIDAR point cloud data.
Shipping containers	Shipping containers would be removed by the project at Tyne Containers in NCA02 and NCA03. The containers are included in the No Build scenario and removed from the Build scenario. Shipping containers are also stored at the Cooks River Container Terminal, which is to the north of the project site in NCA01. These containers are typically stacked three to six containers high which may provide some noise shielding to nearby receivers. As the location of these containers changes, a conservative approach has been used in the modelling and they have not been included in any assessment scenarios.
Buildings, receiver locations and floors	Buildings can provide screening to more distant locations of the project. The level of screening and associated noise attenuation is dependent on the height and width of the intervening buildings. The buildings in the noise model were generated from a combination of aerial photography and site inspections, with heights derived from LIDAR data. The model predicts noise to every facade of every identified receiver in the assessment area using the following heights: • Ground floor – 1.5m[1] • First floor – 4.5m[1]. All floors of multi-storey receivers are included in the assessment.
Study area	The area extends 600 m from the project roads, reduced according to the NCG procedures which define the highly urban area.
Assessment timeframes	The project is assessed 'at-opening' in 2026 and in the 'future design' year in 2036.
Traffic volumes	Existing traffic volumes were measured at the same time as the noise monitoring survey. This data was used to model the existing situation and validate the operational model. The predicted traffic volumes for the 2026 and 2036 assessment years were provided by the project team. All major roads in the study area were included in the noise model.
Vehicle speed	Existing vehicle speeds were measured during the noise monitoring survey and used to validate the noise model. Existing and future posted vehicle speeds were used in the operational assessment.
Source heights and source correction	Vehicles generally emit road traffic noise at four source heights. These are represented in the noise model by the following: • Cars (at 0.5 m height with a source correction of 0.0 dB) • Truck tyres (at 0.5 m height with a source correction of -5.4 dB) • Truck engines (at 1.5 m height with a source correction of -2.4 dB) • Truck exhausts (at 3.6 m height with a source correction of -8.5 dB).
Road surface corrections	The existing and proposed future road surface in the study area is Dense Grade Asphalt (DGA), which has a 0 dB surface correction factor.

Input Parameter	Source of Data
Noise barriers	No existing noise barriers were identified in the study area.
Ground absorption	Noise levels at receivers can be influenced by the type of ground between the source of noise and the receiver. Soft ground such as vegetation can reduce noise to a greater degree than hard ground, such as concrete or road surfaces. A ground absorption factor of 50% has been used in the noise model, as per the Roads and Maritime *Model Validation Guideline* specification for residential areas[2].
General corrections	The model also includes the following corrections to convert the noise model outputs to the appropriate assessment noise levels: • Facade reflections +2.5 dB[2] • L_{A10} to L_{Aeq} -3 dB[2] • $L_{Aeq(15hour)}$ to $L_{Aeq(1hour)}$ +2.0 dB[3] • $L_{Aeq(9hour)}$ to $L_{Aeq(1hour)}$ +3.6 dB[3].

Note 1: These are typical heights above ground level, the height of some receivers were adjusted according to site survey information.

Note 2: Taken from the Roads and Maritime *Model Validation Guideline.*

Note 3: Derived from the existing noise monitoring data which is summarised in **Section 2**. Corrections are based on the median difference between the peak 1 hour results and the corresponding daytime/night-time results, at monitoring locations L01, L02, L04, L05 and L06.

4.4.8 Noise Model Validation

To validate the operational road traffic noise model, the 2018 existing scenario was modelled and compared to existing noise measurements in the study area (see **Section 2**). The validation measurement sites are shown in **Figure 4** and **Figure 5**, and a summary of the noise model validation is provided in **Table 33**. Only noise monitoring locations which were used for model validation purposes are shown.

Table 33 Comparison of Measured and Predicted Road Traffic Noise Levels

Location	Noise Level (dBA)[1]					
	Daytime $L_{Aeq(15hour)}$			Night-time $L_{Aeq(9hour)}$		
	Measured	Predicted	Difference[2]	Measured	Predicted	Difference[2]
L01	75.1	75.3	0.2	72.1	72.0	-0.1
L02	74.9	76.4	1.5	71.9	73.7	1.8
L04	63.6[3]	61.1	-[3]	58.1	58.9	0.8
L05	66.5	66.8	0.3	63.1	64.0	0.9
L06	72.5	74.3	1.8	70.5	71.6	1.1
		Median	**0.9**		**Median**	**0.9**

Note 1: Validation of the noise model was done using data from 22 to 26 October 2018. This period excluded weekends which tend to have lower and intermittent traffic volumes.

Note 2: Difference is Predicted minus Measured. A negative difference indicates the predicted level of road traffic noise is lower than the measured data, a positive difference indicates the predicted level is higher.

Note 3: The measured daytime noise data at this location was influenced by other sources of noise such as sporting events or maintenance works at Tempe Recreation Reserve. The daytime period has therefore been excluded from the validation.

The Roads and Maritime *Environmental Noise Management Manual* (ENMM) notes that *"it should be recognised that noise prediction modelling has some accuracy limitations and will commonly produce acceptable errors of around 2 dBA"*.

The above predictions show that the noise model is generally slightly conservative at the validation sites and the difference between the measured and predicted noise levels is within the anticipated accuracy at all locations. On this basis, the model is considered to be performing as expected and is valid for predicting road traffic noise levels for the project.

4.4.9 Noise Mitigation

The Roads and Maritime *Noise Mitigation Guideline* (NMG) provides guidance in managing and controlling road traffic noise and describes the principles to be applied when reviewing noise mitigation. The NMG recognises that the NCG criteria are not always practicable and that it is not always feasible or reasonable to expect that they are achieved.

As projects progress through the early design stages, various road design features are evaluated to assist with minimising road traffic noise. The NMG defines these 'integrated noise reduction measures' as including:

- Adjustments to vertical and horizontal alignments
- Road gradient modifications
- Traffic management
- Cost effective use of won project spoil to provide landscape mounds where there is suitable site footprint.

Following use of the above measures, site specific 'additional noise mitigation measures' are then required to be investigated for receivers which have residual exceedances of the criteria. When evaluating if a receiver qualifies for consideration of 'additional noise mitigation measures' the NMG considers how far above the criterion the noise level is and also how much a project increases noise levels. These considerations provide a feasible and reasonable approach to identifying qualifying receivers.

The NMG provides three triggers where a receiver may qualify for consideration of 'additional noise mitigation' (beyond the use of 'integrated noise reduction measures'). These are:

- **Trigger 1** – the predicted 'Build' noise level exceeds the NCG controlling criterion and the noise level increase due to the project (ie the noise predictions for the 'Build' minus the 'No Build') is greater than 2.0 dB
- **Trigger 2** – the predicted 'Build' noise level is 5 dB or more above the NCG controlling criterion (ie exceeds the cumulative limit) and the receiver is significantly influenced by project road noise, regardless of the incremental impact of the project
- **Trigger 3** – the noise level contribution from the road project is acute (daytime $L_{Aeq(15hour)}$ 65 dBA or higher, or night-time $L_{Aeq(9hour)}$ 60 dBA or higher) even if noise levels are controlled by a non-project road.

The eligibility of receivers for consideration of 'additional noise mitigation' is determined before the benefit of low noise pavement and noise barriers is included. The requirement for the project is to provide feasible and reasonable additional mitigation to eligible receivers with the aim of meeting the NCG controlling criterion.

For receivers that qualify for consideration of 'additional noise mitigation', potential noise mitigation measures are to be considered in the following order of preference:

- At-source mitigation:
  - Quieter road pavement surfaces
- In-corridor mitigation:
  - Noise mounds
  - Noise barriers
- At-receiver mitigation:
  - At-property treatments.

4.4.10 Maximum Noise Levels

Maximum noise levels near roads are generally controlled by noise from trucks. Where roads are located close to residential receivers there is potential for sleep disturbance impacts from maximum noise level events.

The RNP and ENMM both state that while a maximum noise level assessment is required to be undertaken for new and redeveloped road infrastructure projects, it should only be used as a tool to help prioritise and rank mitigation strategies and should not be applied as a decisive criterion.

The purpose of a maximum noise level assessment is to determine where maximum noise levels are likely to change as a result of a project.

The maximum noise level assessment includes an evaluation of the number and distribution of night-time events in accordance with the ENMM. A maximum noise level event is defined as being any passby where:

- The maximum noise level of the event is greater than 65 dBA L_{AFmax}

  and

- The L_{AFmax} – $L_{Aeq(1hour)}$ is greater than or equal to 15 dB.

Existing maximum noise levels were monitored in the study area during the unattended noise monitoring survey (see **Section 2.2**). The potential for changes in maximum noise levels to nearby sensitive receivers are then evaluated where the project introduces new or redeveloped roads.

4.5 Ground-based Airport Noise Modelling Methodology

The noise model of the study area has been used to predict aircraft related ground-based noise levels from Sydney Airport to the surrounding receivers.

Local terrain, receiver buildings and structures were digitised in the noise model to develop a three-dimensional representation of the airport and surrounding areas.

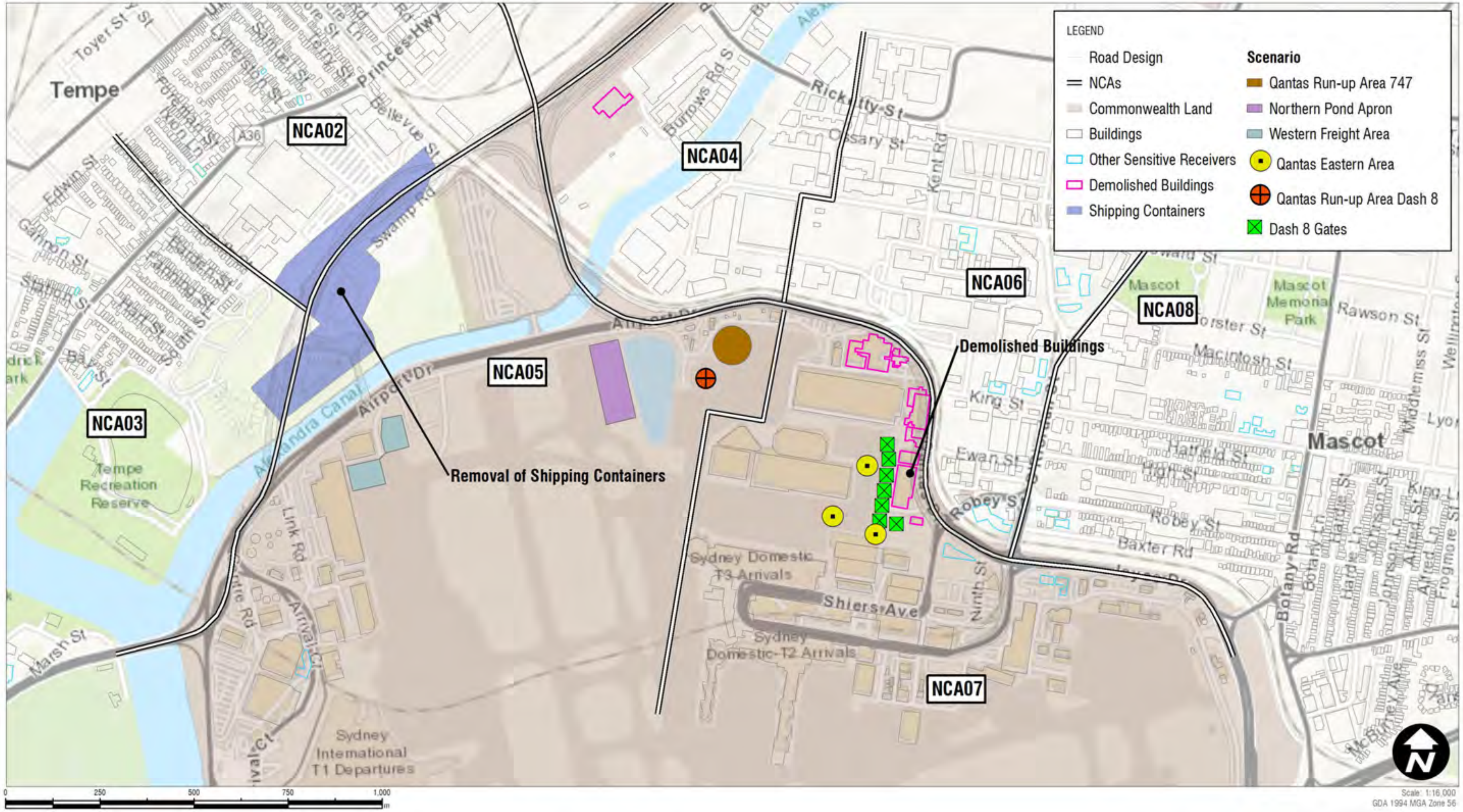
4.5.1 Project Features

The project has the potential to alter aircraft related ground-based noise impacts at receivers which are near to the airport. The features of the project that may alter existing Sydney Airport aircraft related ground-based noise levels include:

- Removal of shipping containers at Tyne Containers. Shipping containers are currently stacked a minimum of three containers high around the boundary of the site. The project would require the land and remove the containers, which could result in reduced noise screening of ground-based noise at residential receivers to the north of Tempe Reserve.
- Demolition of several airport buildings adjacent to Qantas Drive. The removal of these buildings could result in removed noise screening for receivers to the east of the airport from ground-based activities such as engine run-ups.

The locations of the above features in relation to the potentially affected receivers are shown in **Figure 9**.

Figure 9 Aircraft Related Ground-based Activities



4.5.2 Assessment Scenarios

A number of scenarios have been developed to assess the potential changes to noise impacts from aircraft related ground-based activities as a result of the project. The details of the scenarios are shown in **Table 34** and the locations are in **Figure 9**.

Table 34 Aircraft Related Ground-based Assessment Scenarios

ID	Location	Source Details					
		Aircraft	Activity	Number	Setting	Duration	SWL (dBA)
1	Qantas run up area 747	747-400	Engine run-up	1	Full power	15 minute	150
2	Qantas run up area Dash 8	Dash 8	Engine run-up	1	Full power	15 minute	144
3	Northern pond apron	747-400	APU	3	APU	15 minute	128
4	Western freight area	747-400	APU	2	APU	15 minute	128
5	Qantas eastern area[1]	Dash 8	Taxiing	3	Low power	15 minute	132
6	Dash 8 gates[1]	Dash 8	APU and taxiing	7	APU and low power	15 minute	130 and 132

Note 1: Directivity due to specific aircraft orientation has been applied to these scenarios, based on operational APU test data in the Bombardier Q400 Airport Planning Manual.

The potential changes to ground-based airport noise levels have been assessed using the following predictions:

- Existing scenario – this represents the airport and surrounding areas as they currently are
- 'With project' scenario – this assumes the project goes ahead and demolishes the airport buildings near Qantas Drive and removes the shipping containers at Tyne Containers.

5 Assessment of Construction Impacts

5.1 Summary of Key Findings

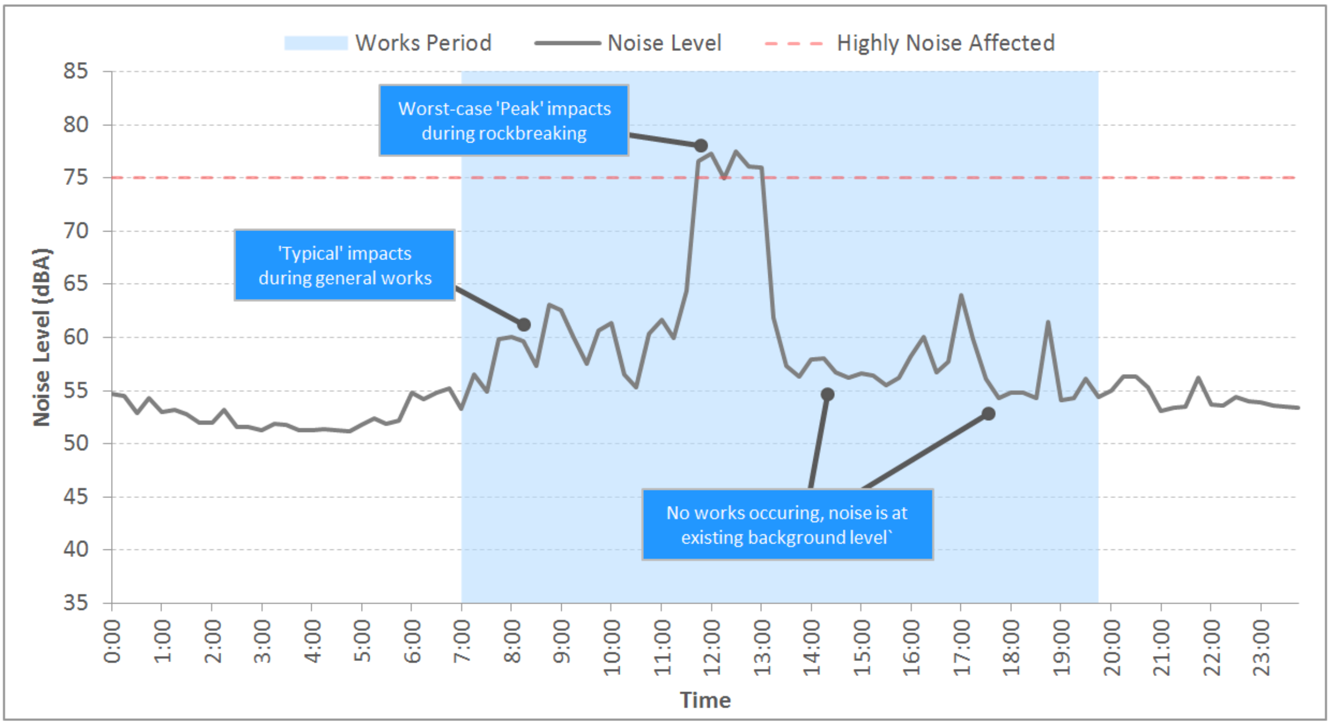
- Construction noise impacts at residential receivers are generally limited to NCA03, NCA06 and NCA08. The other catchments either have no residential receivers or receivers are far enough from the works to generally be compliant with the management levels.
- While impacts across the project as a whole are relatively low for a major infrastructure project, 'high' impacts are likely at some of the nearest receivers when noise intensive equipment such as rockbreakers or concrete saws are in use. Noise intensive equipment would, however, generally only be required for relatively short periods and noise levels and impacts during typical works are significantly lower and generally result in either compliant noise levels or 'minor' impacts.
- There are several locations of the project site where construction can occur with little or no impact due to the distant location of the nearest residential receivers.
- One residential receiver on Baxter Road in Mascot is predicted to be Highly Noise Affected from the project when the noisiest works scenario (*Enabling Works*) is nearby and rockbreakers or concrete saws are in use.
- The closest hotels to the project, near the Joyce Drive and O'Riordan Street intersection, are likely to be subject to 'high' worst-case impacts when noise intensive equipment is being used nearby.
- The Qantas Flight Training Centre is located next to Qantas Drive and has several specialist flight simulators and other areas that are highly sensitive to impacts. When works are outside the centre, the use of noise intensive equipment is likely to result in 'high' worst-case impacts. As works move away, the noise levels would reduce and be compliant or result in 'minor' exceedances.
- 'Moderate' worst-case impacts were identified at the nearest commercial receivers to the project when noise intensive equipment is in use.
- The distance between the construction works and the nearest vibration sensitive receivers is generally sufficient for most buildings to be unlikely to suffer cosmetic damage from construction vibration. Some buildings are, however, within the recommended minimum working distance, particularly in the eastern section of the study area, near Qantas Drive.
- Most receivers are also far enough away from the project site for ground-borne noise impacts to be minimal. A number of hotels and commercial receivers near the Joyce Drive and O'Riordan Street intersection and along Qantas Drive may, however, be impacted by ground-borne noise depending on the specific location of sensitive areas inside each receiver and the existing facade performance.

5.2 Overview of Construction Impacts at Residential Receivers

The following overview is based on the predicted noise impacts at the most affected receivers in each NCA and is representative of the worst-case situation where construction equipment is at the closest point to each receiver.

For most works, the construction noise impacts would frequently be lower than predicted as the worst-case situation is typically only apparent for a relatively short period when noisy equipment is in use nearby. This concept is illustrated indicatively in **Figure 10** which shows noise levels measured next to major construction works during a period of 'Peak' impact rockbreaking and shows how construction noise levels can vary over the works period.

Figure 10 Example of Indicative Construction Noise Levels during Rockbreaking



Note: The measurement location was around 40 m away from the works.

In the above example, while the worst-case levels do result in Highly Noise Affected impacts, these only last for part of the works period and the noise levels during 'Typical' activities are much lower. There are also periods when no works are occurring and noise levels are at existing background level (eg road traffic and general urban hum).

The following assessment shows the predicted noise impacts based on the exceedance of the NML, as per the three categories in **Table 35**. The likely subjective response of people affected by the impacts is also shown in the table, noting that the subjective response would vary and depends on the period in which the impacts occur (ie people are generally less sensitive to impacts during the daytime and more sensitive in the evening and night-time).

Table 35 NML Exceedance Bands and Corresponding Subjective Response to Impacts

Exceedance of NML	Symbol	Likely Subjective Response
Compliance	·	Barely perceptible
1 to 10 dB	●	Marginal to minor
11 dB to 20 dB	◆	Moderate
>20 dB	■	High

The predicted construction noise impacts are presented for the most affected receivers. Receivers which are further away from the works and/or shielded from view would have substantially lower impacts. The assessment is generally considered conservative as the calculations assume several items of construction equipment are in use at the same time within individual scenarios.

A summary of the predicted construction noise impacts in each NCA for residential receivers is shown in **Table 36**. Detailed noise level predictions and summaries of the number of receivers predicted to have 'minor', 'moderate' and 'high' impacts in each NCA are provided in **Appendix D**.

Where impacts are predicted, the methods for controlling the impacts through the use of mitigation measures and management techniques are discussed in more detail in **Section 8.1**.

Table 36 Predicted Worst-case Construction Noise Exceedances – Residential Receivers

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
Daytime	1a	Enabling Works (inc. utilities)	Peak	•	•	•	●	•	•	•	•	◆
	1b		Typical	•	•	•	•	•	•	•	•	•
	2a	Compound Establishment	Peak	•	•	•	●	•	•	•	•	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	•	•	•	•	•	•
	3a	Site Establishment		•	•	•	●	•	•	•	•	●
	4a	Demolition	Peak	•	•	•	•	•	•	•	•	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	•	•	•	●	•	•	•	•	•
	5b		Typical	•	•	•	•	•	•	•	•	•
	6a	Road Works	Peak	•	•	•	●	•	•	•	•	•
	6b		Typical	•	•	•	•	•	•	•	•	•
	6c		Dynamic Compaction	•	•	•	•	•	•	•	•	•
	7a	Finishing Works		•	•	•	•	•	•	•	•	•
Evening	1a	Enabling Works (inc. utilities)	Peak	●	•	•	●	•	•	●	•	◆
	1b		Typical	•	•	•	•	•	•	•	•	●
	2a	Compound Establishment	Peak	•	•	•	•	•	•	•	•	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	●	•	•	•	•	•
	3a	Site Establishment		•	•	•	◆	•	•	•	•	◆
	4a	Demolition	Peak	•	•	•	•	•	•	•	•	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	•	•	•	●	•	•	•	•	●
	5b		Typical	•	•	•	●	•	•	•	•	•
	6a	Road Works	Peak	●	•	•	◆	•	•	●	•	●
	6b		Typical	•	•	•	●	•	•	•	•	•
	6c		Dynamic Compaction	•	•	•	●	•	•	•	•	•
	7a	Finishing Works		•	•	•	●	•	•	•	•	•
Night-time	1a	Enabling Works (inc. utilities)	Peak	●	•	●	◆	•	•	◆	•	■
	1b		Typical	•	•	•	•	•	•	•	•	◆
	2a	Compound Establishment	Peak	•	•	•	•	•	•	•	•	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	●	•	•	•	•	•
	3a	Site Establishment		•	•	•	◆	•	•	●	•	◆
	4a	Demolition	Peak	•	•	•	•	•	•	•	•	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	●	•	●	◆	•	•	●	•	●
	5b		Typical	•	•	•	●	•	•	•	•	●
	6a	Road Works	Peak	●	•	●	◆	•	•	●	•	●
	6b		Typical	•	•	•	●	•	•	•	•	•
	6c		Dynamic Compaction	•	•	•	●	•	•	•	•	•
	7a	Finishing Works		•	•	•	●	•	•	•	•	•

Key to Impacts ● Marginal to minor (1 to 10 dB) ◆ Moderate (11 dB to 20 dB) ■ High (>20 dB)

The above assessment for residential receivers shows that:

- The impacts are generally limited to NCA03, NCA06 and NCA08. The other catchments either have no residential receivers or receivers are sufficiently far from the works to generally be compliant with the NMLs.
- Worst-case noise levels at the nearest receivers are around 65 to 75 dBA (see **Appendix D**). Worst-case noise levels in NCAs where receivers are more distant are typically around 50 to 55 dBA.
- The highest impacts are generally seen in the 'Peak' scenarios, which is due to the use of noise intensive equipment such as rockbreakers or concrete saws. For most scenarios, the 'Peak' works would, however, only be required for a relatively short period of the total project duration. Noise levels and impacts during the 'Typical' works are significantly lower and typically result in either compliant noise levels or 'minor' impacts.
- The residential receivers with the highest impacts are in NCA03 (to the north of Tempe Recreation Reserve on South Street and Smith Street) where the nearest receivers are around 100 metres from the works at the former Tempe Tip site, and also in NCA08 (on Baxter Road in Mascot) due to the proximity of these receivers to the works near the intersection of Qantas Drive and O'Riordan Street.
- The worst-case impacts at residential receivers in NCA00, NCA02 and NCA06 are generally predicted to be 'minor'.
- During the daytime, the worst-case impacts are predicted to be 'minor' in NCA03 and 'moderate' in NCA08, with noise levels expected to be compliant in all other catchments. During the night-time, the worst-case impacts are predicted to be 'high' in NCA08 during one scenario, with 'moderate' impacts in 'NCA03' and NCA06, and 'minor' impacts in NCA00 and NCA02.
- Impacts are generally higher during the evening and night-time periods than during the daytime, which is due to more stringent criteria in these periods.
- The worst-case impacts are typically associated with the following works:
  - *Scenario 1a, Enabling Works (inc. Utilities) – Peak*
  - *Scenario 3a, Site Establishment*
  - *Scenario 5a, Bridges – Peak*
  - *Scenario 6a, Road Works – Peak.*
- Works that do not require noise intensive equipment result in considerably lower impacts.
- There are several locations of the project site where construction can occur with little or no impact due to the distant location of the nearest residential receivers.
- It is noted that some of the affected receivers are adjacent, or near, to major existing roads and are subject to relatively high existing noise levels. The unattended noise monitoring in **Section 2.2** shows existing noise levels next to major roads are in the region of 65 to 75 dB during the daytime and 60 to 70 dB during the night-time. This is comparable to, or higher than, the predicted construction noise levels for many of the assessed work scenarios (see **Appendix D**).

5.3 Detailed Construction Noise Impacts – All Receiver Types

The predicted construction noise impacts from each works scenario are provided in assessment tables in **Appendix D** for each NCA. The following sections provide a detailed discussion of the key construction impacts at all receivers which are associated with:

- *Enabling Works (including Utilities)*, which is the scenario with the predicted **worst-case impacts** (ie the highest predicted NML exceedances and most number of receivers affected)
- *Compound Operation* and *Road Works*, which are the two scenarios with the **longest duration**.

5.3.1 Worst-case Scenario

5.3.1.1 Enabling Works – All Locations

The worst-case construction impacts are predicted during *Enabling Works* when noise intensive equipment like concrete saws or rockbreakers are in use. The predicted night-time impacts during *Enabling Works* are shown in:

- **Figure 11** – *Scenario 1a, Enabling Works (inc. Utilities) – Peak*, when noise intensive equipment is being used as part of these works
- **Figure 12** – *Scenario 1b, Enabling Works (inc. Utilities) – Typical*, for works when typical activities are being completed that do not require noise intensive equipment.

'Typical' *Enabling Works* are anticipated to last between six months and one year depending on location (see **Table 28**), with the 'Peak' works expected to take two to six months.

Noise intensive equipment would be required during some of the 'Peak' works, with rockbreakers and concrete saws being used at times during the night-time as certain aspects of the works can only take place during road closures to minimise the impact on the surrounding roads.

Figure 11 Predicted Impacts 'Scenario 1a, Enabling Works – Peak' in All Locations (Night-time)

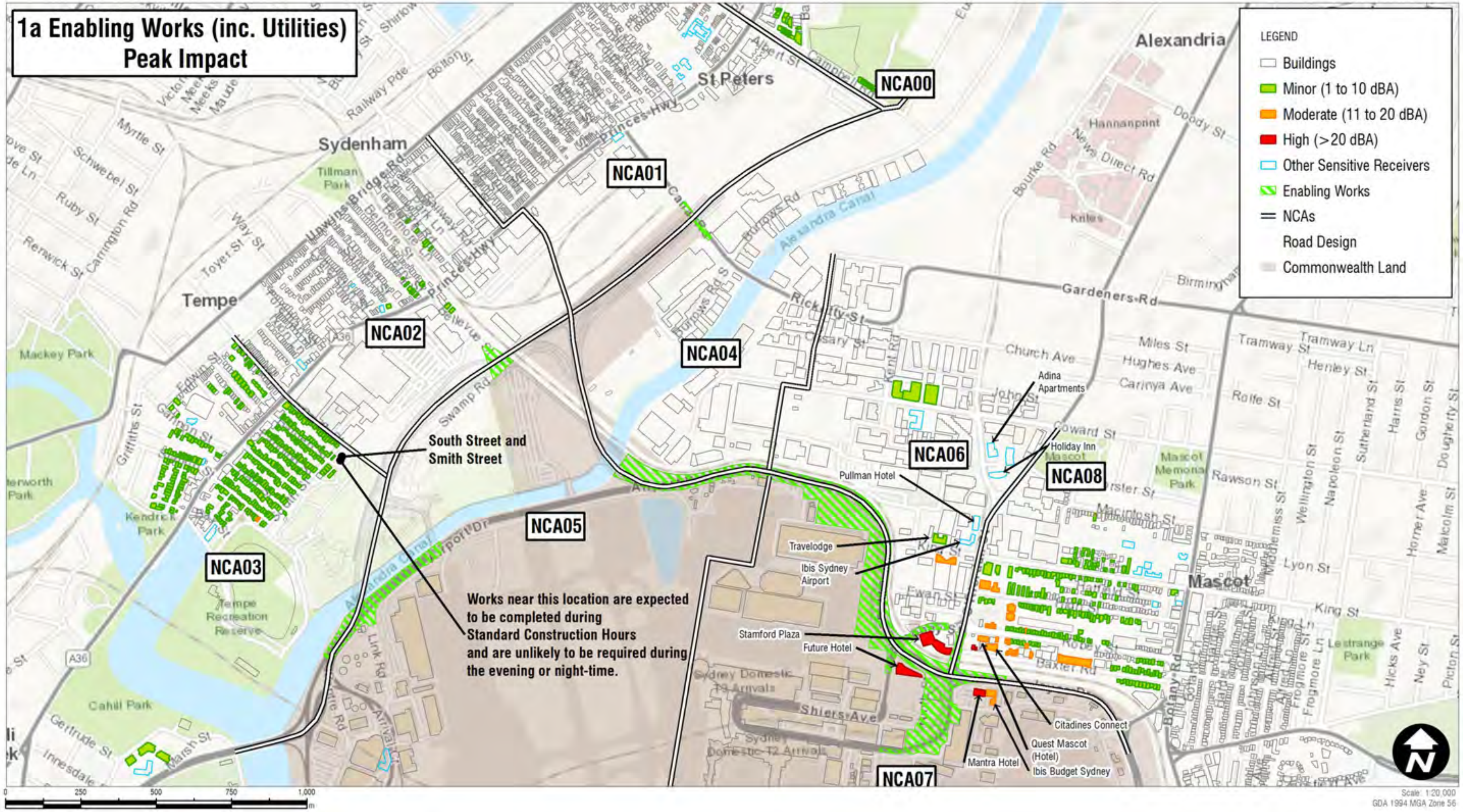
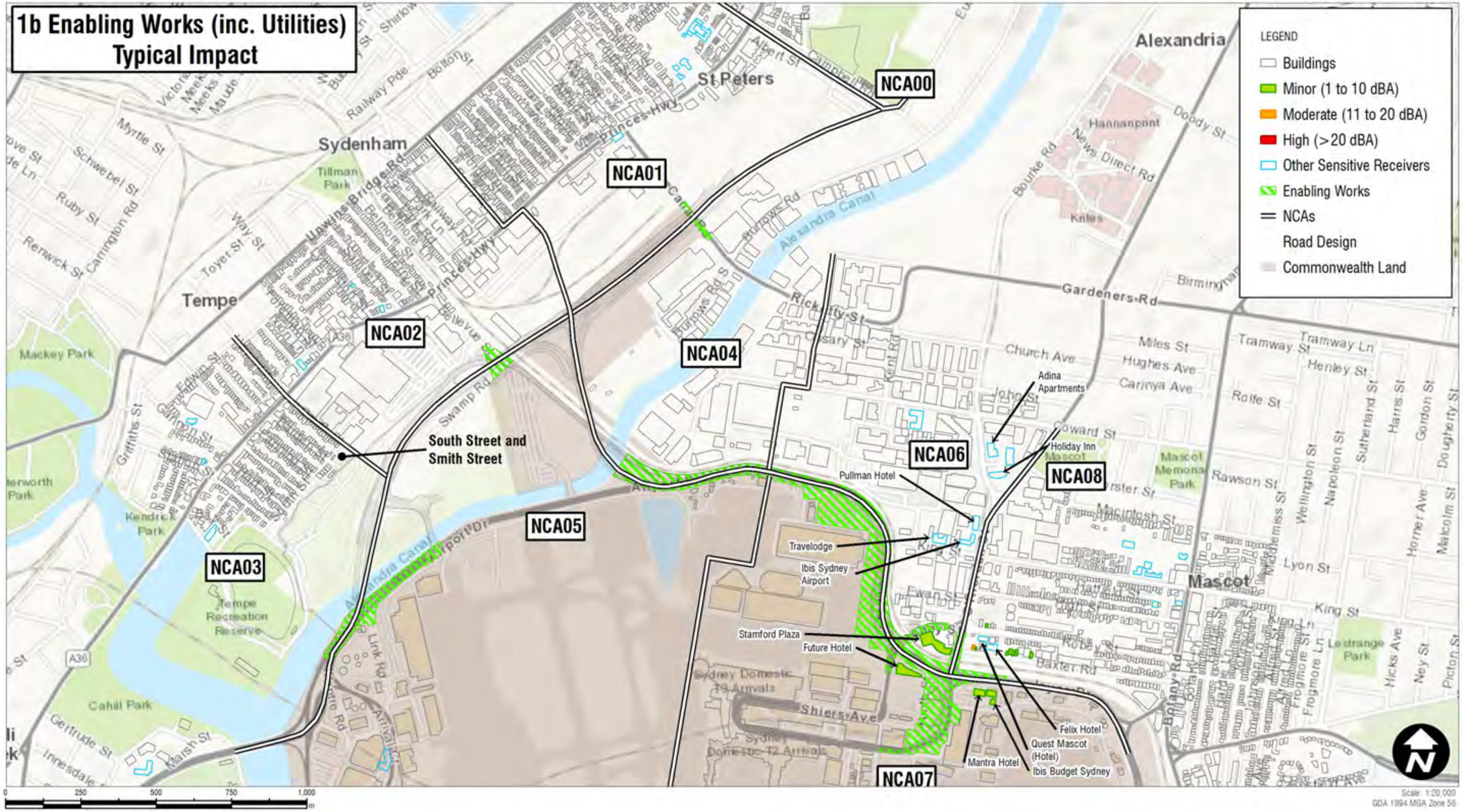


Figure 12 Predicted Impacts 'Scenario 1b, Enabling Works – Typical' in All Locations (Night-time)



The above figures show that for 'Peak' *Enabling Works*, a number of receivers are predicted to have 'high' worst-case impacts in the night-time, which is due to noise intensive equipment such as rockbreakers or concrete saws. The most affected location is near the intersection of Joyce Drive and O'Riordan Street in NCA06, NCA07 and NCA08, where a number of hotels are located.

While the 'Peak' *Enabling Works* assessment predicts many residential receivers would be subject to 'minor' impacts during the night-time in NCA03 in Tempe, works near South and Smith Street are related to construction of new roads and it is expected that the majority of these works would be able to be completed during Standard Construction Hours. As the works here would not be in existing trafficable roads there would be minimal need for construction during the evening or night-time.

Many residential receivers are also predicted to be impacted in NCA08 in Mascot when 'Peak' *Enabling Works* are being carried out in the night-time. Works outside of Standard Construction Hours would be required in this section of the project site at certain times due to construction occurring in or near to trafficable parts of the road network.

During 'Typical' works, when noise intensive equipment is not being used, the noise levels would be substantially lower with much fewer receivers affected. Worst-case impacts are generally reduced to compliant or 'minor' impacts at the nearest receivers.

The impacts presented above are based on all equipment working simultaneously in each assessed scenario. There would frequently be periods when construction noise levels are much lower than the worst-case levels predicted and there would be times when no equipment is in use and no impacts occur. The impacts would also be lower than predicted when works are occurring in distant parts of the project site or where they are screened from view of the nearest receivers.

5.3.2 Longest Duration Scenarios

The longest duration works scenarios are *Compound Operation* and *Road Works*. *Compound Operation* includes activities at compounds such as deliveries and storage of equipment and material. Compound operation would generally not require noise intensive equipment.

Road Works are required along the entire road alignment and involve excavating and compacting the ground, laying the road surface and pavement works. Noise intensive works using concrete saws would be required at certain times in some locations, such as where tie-ins to existing infrastructure are required.

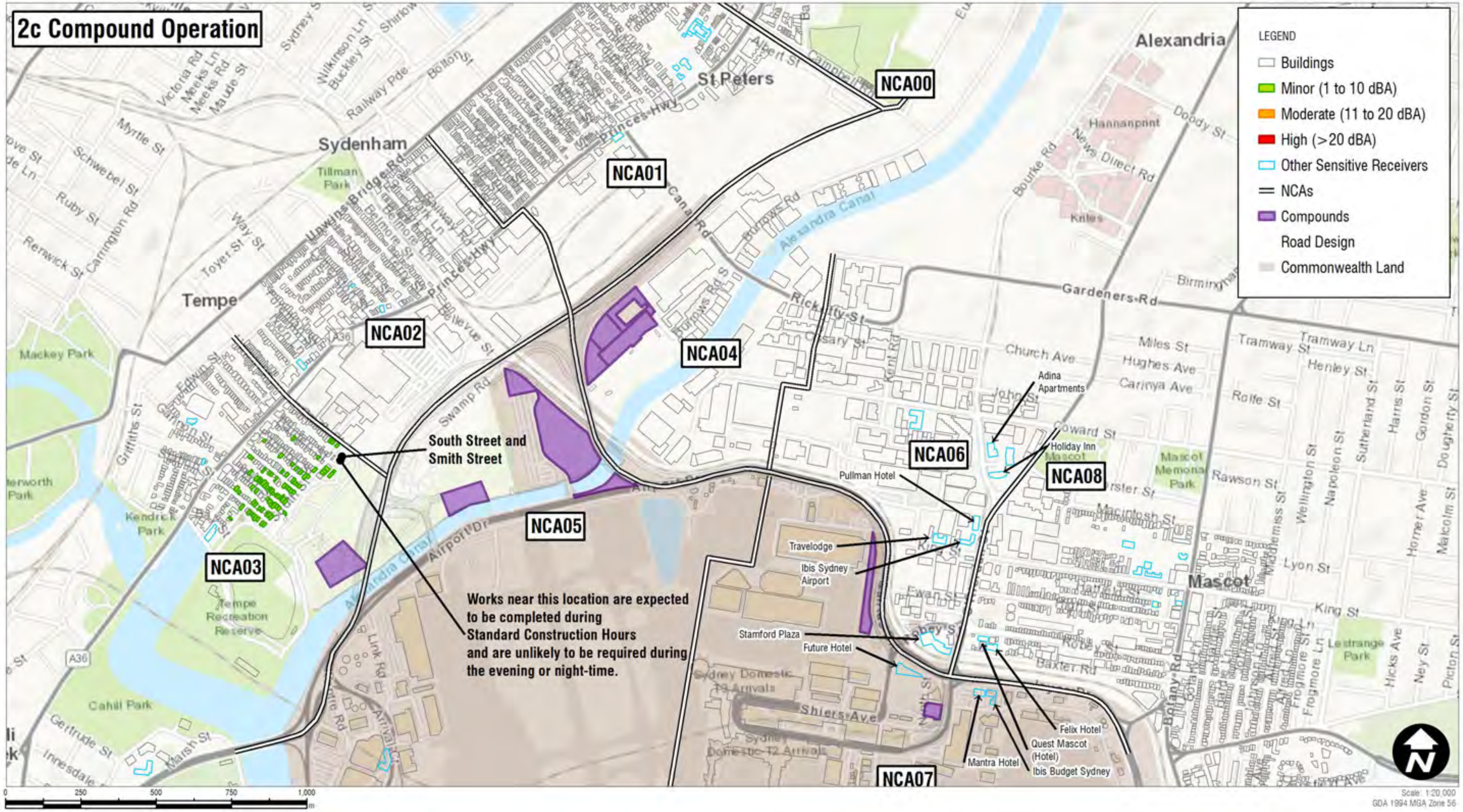
5.3.2.1 Compound Operation

The predicted night-time impacts during *Compound Operation* are shown in:

- **Figure 13** – *Scenario 2c, Compound Operation*.

Compound Operation works are anticipated to last between two and a half and four years, depending on location.

Figure 13 Predicted Impacts 'Scenario 2c, Compound Operation' in All Locations (Night-time)



The above figure shows during *Compound Operation*, most compounds are sufficiently far enough from the nearest receivers for impacts to be compliant with the goals. The only exception is to the north of Tempe Recreation Reserve on South Street and Smith Street in NCA03.

The nearest receivers in this area are likely to have 'minor' worst-case impacts when works are occurring during the night-time at the compound near to Tempe Recreation Reserve.

However, as noted earlier, works near South and Smith Street are related to construction of new roads and it is expected that the majority of these works would be able to be completed during Standard Construction Hours, with minimal requirement for construction during the evening or night-time.

The impacts presented above are based on all equipment working simultaneously in each assessed scenario. There would frequently be periods when construction noise levels are much lower than the worst-case levels predicted and there would be times when no equipment is in use and no impacts occur. The impacts would also be lower than predicted when works are occurring in distant parts of the project site or where they are screened from view of the nearest receivers.

5.3.2.2 Road Works

The predicted night-time impacts during *Road Works* are shown in:

- **Figure 14** – *Scenario 6a, Road Works – Peak*, when noise intensive equipment is being used as part of these works
- **Figure 15** – *Scenario 6b, Road Works – Typical*, for works when typical activities are being completed, including operation of the compounds, that do not require the use of noise intensive equipment.

'Typical' *Road Works* are anticipated to last between 18 months and three years and 'Peak' *Road Works* are expected to take between two months and one year.

Figure 14 Predicted Impacts 'Scenario 6a, Road Works – Peak' in All Locations (Night-time)

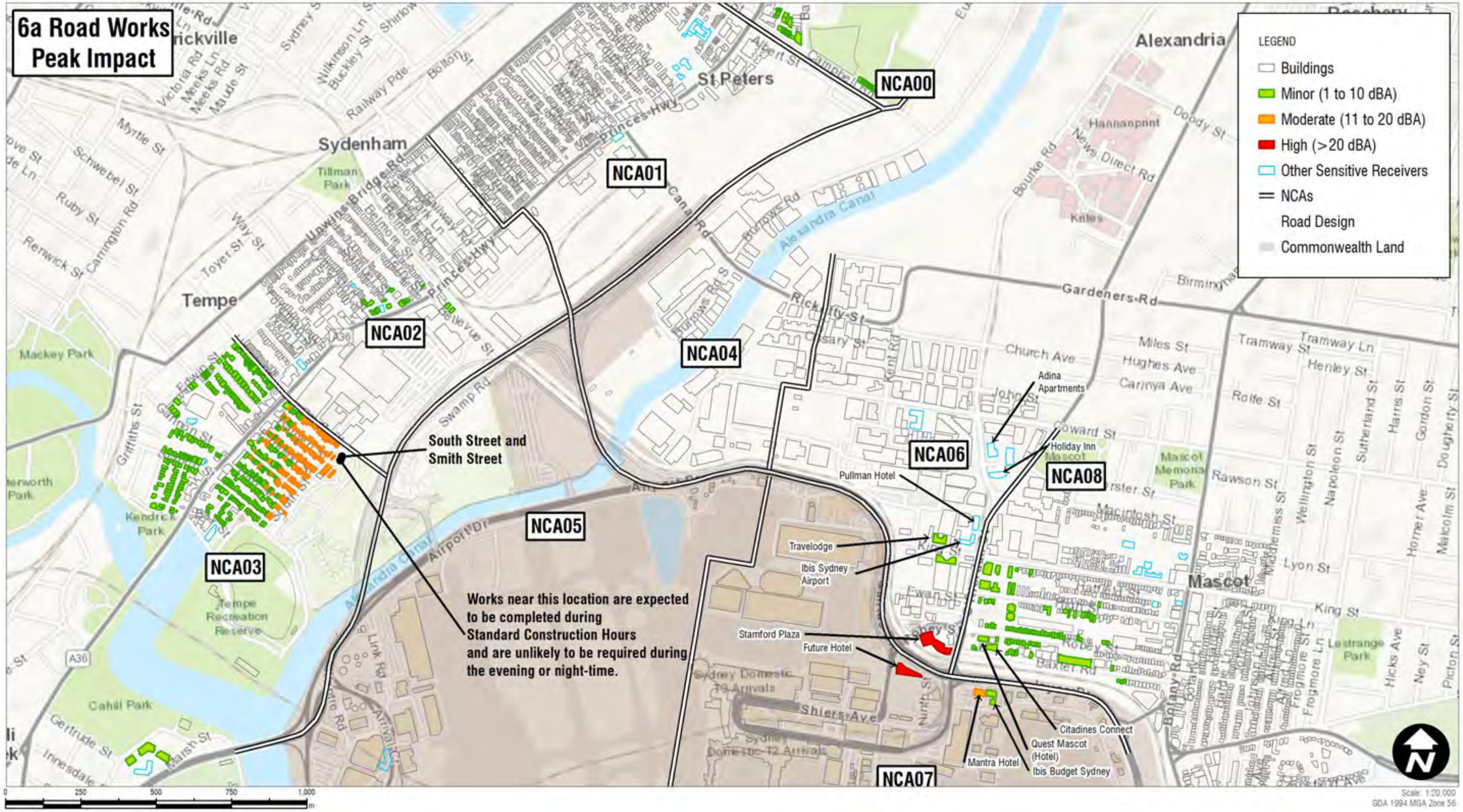
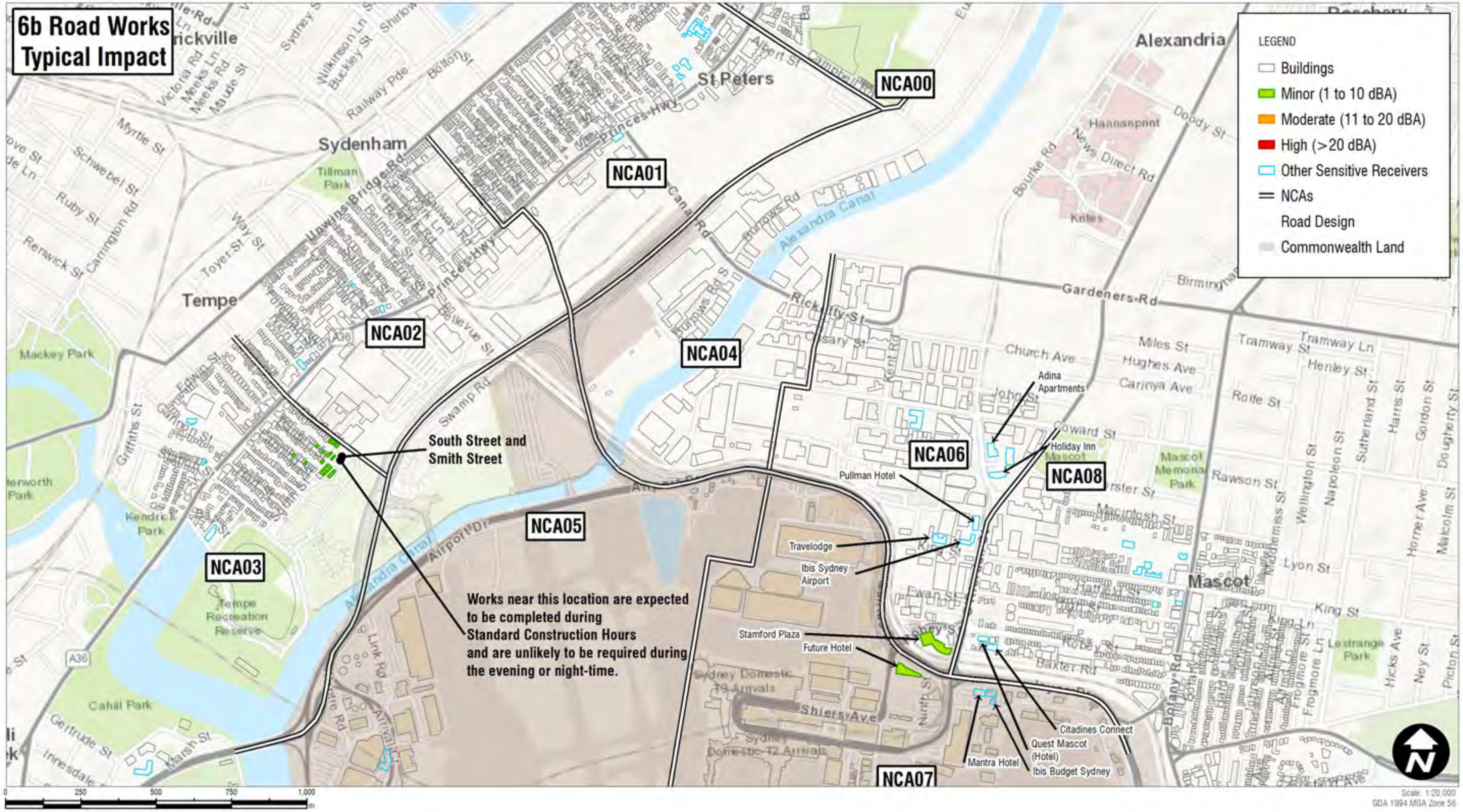


Figure 15 Predicted Impacts 'Scenario 6b, Road Works – Typical' in All Locations (Night-time)



The above figures show that for 'Peak' *Road Works*, a small number of receivers are predicted to have 'high' worst-case impacts, which is due to the use of noise intensive equipment such as rockbreakers or concrete saws. The most affected locations are the Stamford Plaza hotel in NCA06 and the future airport hotel site in NCA07.

'Moderate' worst-case impacts are predicted in the following locations:

- To the north of Tempe Recreation Reserve on South Street and Smith Street in NCA03
- At the Mantra Hotel in NCA07.

Works near South and Smith Street are, however, related to construction of new roads and it is expected that the majority of these works would be able to be completed during Standard Construction Hours, with minimal requirement for construction during the evening or night-time.

During 'Typical' works, when noise intensive equipment is not being used, the noise levels would be substantially lower with much fewer receivers affected. Worst-case impacts are reduced to 'minor' at the nearest receivers.

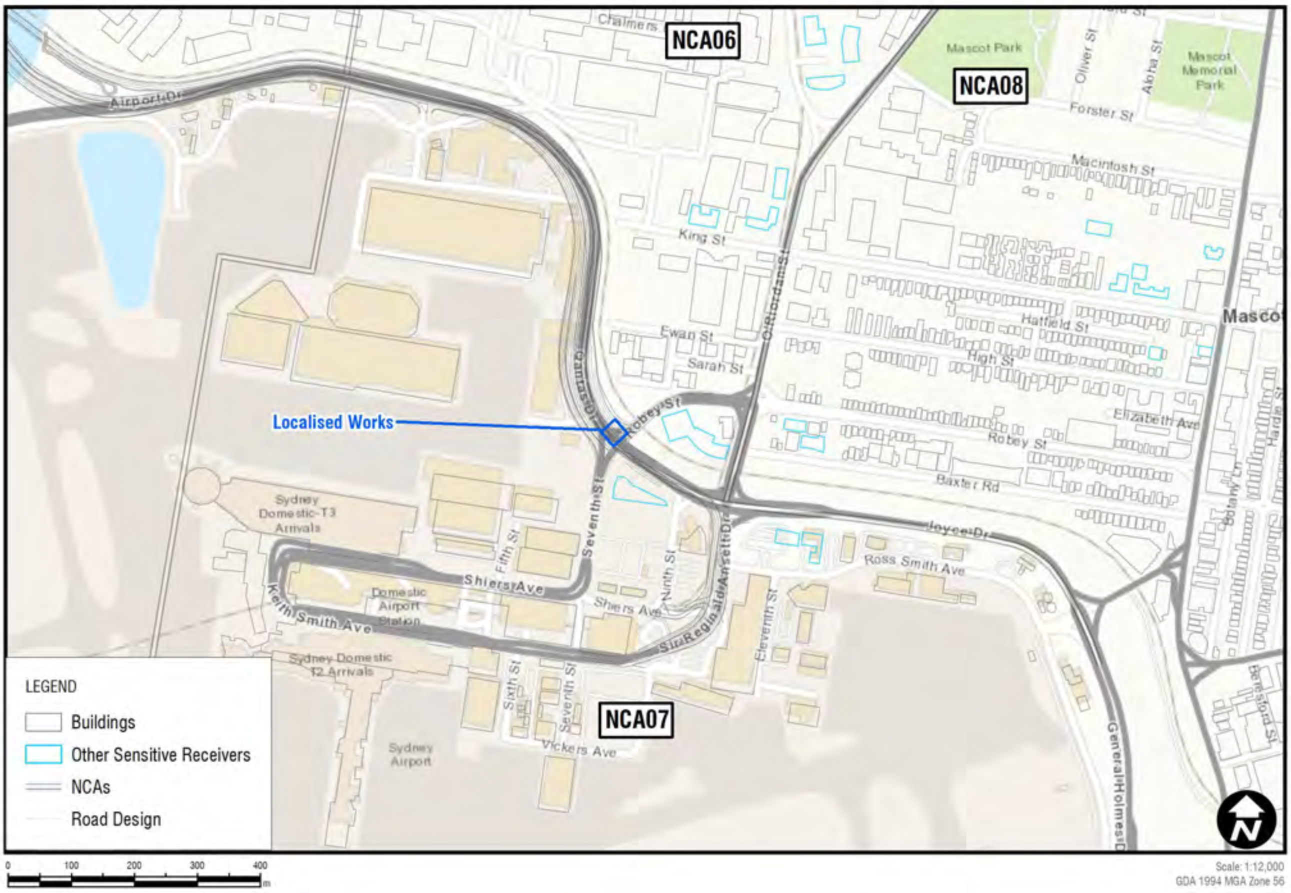
The impacts presented above are based on all equipment working simultaneously in each assessed scenario. There would frequently be periods when construction noise levels are much lower than the worst-case levels predicted and there would be times when no equipment is in use and no impacts occur. The impacts would also be lower than predicted when works are occurring in distant parts of the project site or where they are screened from view of the nearest receivers.

5.3.3 Example of Works in One Location

The above assessments present the impacts from the various construction scenarios assuming works are occurring at all locations at the same time. In many cases, works would occur at discrete locations before moving on to the next area which would limit the extent of impacts on receivers that are near each individual work area.

This has been simulated by modelling works in one location. The works location has been positioned at the intersection of Qantas Drive and Robey Street, near the boundary of NCA06 and NCA08, as shown in **Figure 16**.

Figure 16 Example of Works in One Location



A summary of the predicted residential receiver noise impacts from this scenario is shown in **Table 37**. The predicted worst-case night-time impacts at all receiver types are shown in **Figure 17**.

Table 37 Predicted Worst-case Construction Noise Exceedances – Residential Receivers, Works in One Location

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
Daytime	1a	Enabling Works (inc. utilities)	Peak	•	•	•	•	•	•	•	•	•
	1b		Typical	•	•	•	•	•	•	•	•	•
	2a	Compound Establishment	Peak	•	•	•	•	•	•	•	•	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	•	•	•	•	•	•
	3a	Site Establishment		•	•	•	•	•	•	•	•	•
	4a	Demolition	Peak	•	•	•	•	•	•	•	•	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	•	•	•	•	•	•	•	•	•
	5b		Typical	•	•	•	•	•	•	•	•	•
	6a	Road Works	Peak	•	•	•	•	•	•	•	•	•
	6b		Typical	•	•	•	•	•	•	•	•	•
	6c		Dynamic Compaction	•	•	•	•	•	•	•	•	•
	7a	Finishing Works		•	•	•	•	•	•	•	•	•
Evening	1a	Enabling Works (inc. utilities)	Peak	•	•	•	•	•	•	•	•	•
	1b		Typical	•	•	•	•	•	•	•	•	•
	2a	Compound Establishment	Peak	•	•	•	•	•	•	•	•	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	•	•	•	•	•	•
	3a	Site Establishment		•	•	•	•	•	•	•	•	•
	4a	Demolition	Peak	•	•	•	•	•	•	•	•	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	•	•	•	•	•	•	•	•	•
	5b		Typical	•	•	•	•	•	•	•	•	•
	6a	Road Works	Peak	•	•	•	•	•	•	•	•	•
	6b		Typical	•	•	•	•	•	•	•	•	•
	6c		Dynamic Compaction	•	•	•	•	•	•	•	•	•
	7a	Finishing Works		•	•	•	•	•	•	•	•	•
Night-time	1a	Enabling Works (inc. utilities)	Peak	•	•	•	•	•	•	●	•	●
	1b		Typical	•	•	•	•	•	•	•	•	•
	2a	Compound Establishment	Peak	•	•	•	•	•	•	•	•	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	•	•	•	•	•	•
	3a	Site Establishment		•	•	•	•	•	•	•	•	•
	4a	Demolition	Peak	•	•	•	•	•	•	•	•	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	•	•	•	•	•	•	•	•	●
	5b		Typical	•	•	•	•	•	•	•	•	•
	6a	Road Works	Peak	•	•	•	•	•	•	•	•	●
	6b		Typical	•	•	•	•	•	•	•	•	•
	6c		Dynamic Compaction	•	•	•	•	•	•	•	•	•
	7a	Finishing Works		•	•	•	•	•	•	•	•	•

Key to Impacts ● Marginal to minor (1 to 10 dB) ◆ Moderate (11 dB to 20 dB) ■ High (>20 dB)

Figure 17 Predicted Worst-case Impacts for Works in One Location (Night-time)

The above assessment shows when works are in one location near the Qantas Drive and Robey Street intersection, the majority of receivers are predicted to be compliant with the NMLs, which is due to most receivers being distant from this location or shielded from view by intervening buildings and structures.

'Minor' worst-case exceedances are predicted during the night-time at the nearest residential receivers in NCA07 and NCA08, when noise intensive equipment such as rockbreakers or concrete saws are being used in 'Peak' *Enabling Works*, *Bridge Works* or *Road Works*.

During 'Typical' works, compliance with the NMLs is predicted at the nearest residential receivers in all time periods.

The worst-case impacts at the nearest hotels (Stamford Plaza Hotel and the future hotel site) are predicted to be 'moderate' when noise intensive equipment is in use.

5.4 Highly Noise Affected Residential Receivers

Residential receivers that are subject to noise levels of 75 dBA or greater are considered Highly Noise Affected by the ICNG. Receivers can be Highly Noise Affected when noisy works are occurring close to residents.

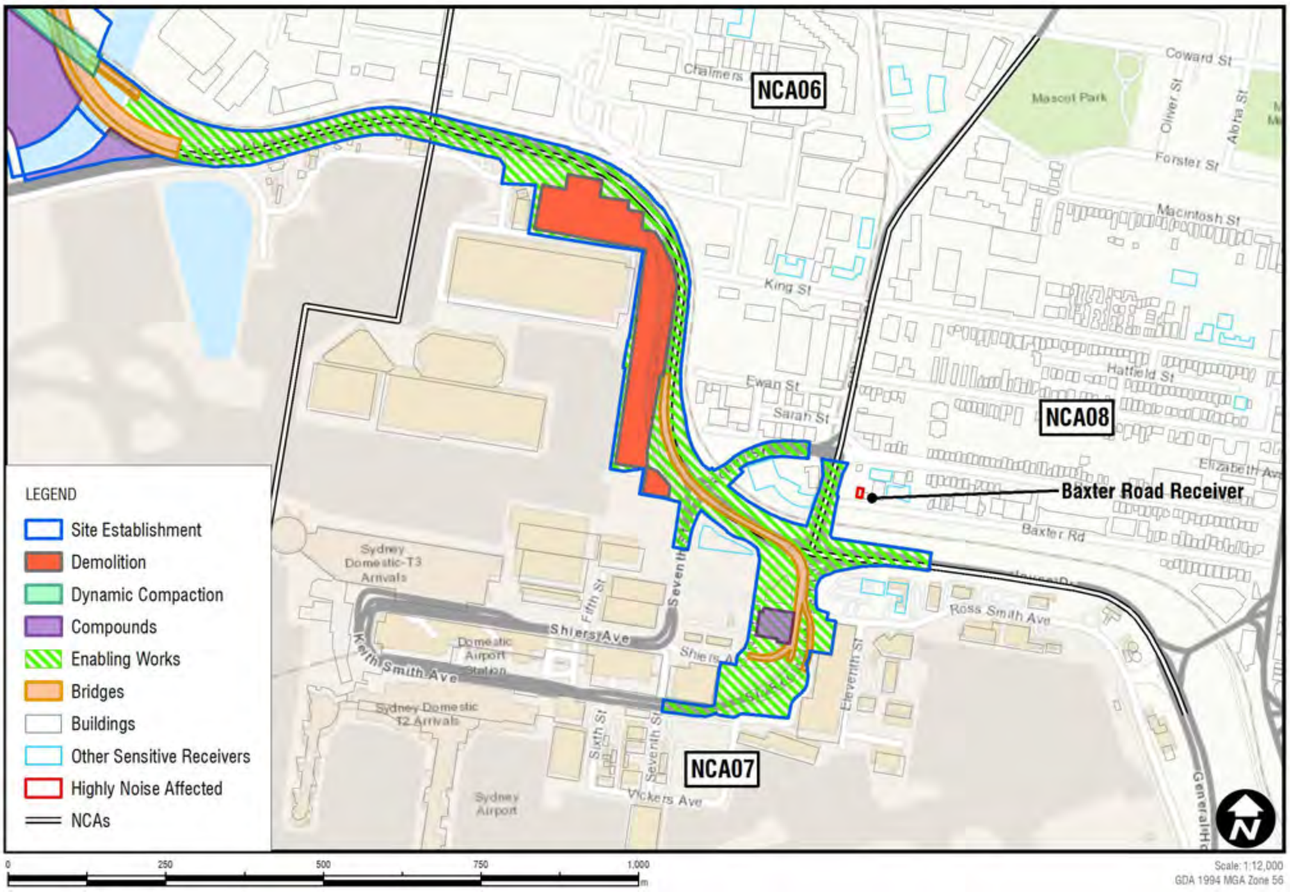
The receivers which could potentially be Highly Noise Affected during the worst-case impacts from the project are summarised in **Table 38** and shown in **Figure 18**.

The predictions assume the worst-case scenarios are occurring at all locations and therefore present all Highly Noise Affected receivers in one assessment.

Table 38 Predicted Number of Highly Noise Affected Residential Receivers

ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
1a	Enabling Works (inc. utilities)	Peak	-	-	-	-	-	-	-	-	1
1b		Typical	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-
2b		Typical	-	-	-	-	-	-	-	-	-
2c	Compound Operation		-	-	-	-	-	-	-	-	-
3a	Site Establishment		-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	-	-	-	-	-	-	-	-	-
4b		Typical	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	-	-	-	-	-	-	-	-	-
5b		Typical	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	-	-	-	-	-	-	-	-	-
6b		Typical	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	-	-	-	-	-	-	-	-	-
7a	Finishing Works		-	-	-	-	-	-	-	-	-

Figure 18 Highly Noise Affected Residential Receivers (All Works)



The only residential receiver predicted to be Highly Noise Affected from the project is on Baxter Road in Mascot during 'Peak' *Enabling Works*. These works would require the use rockbreakers or concrete saws at certain times.

Highly Noise Affected impacts would only occur when noise intensive works are being carried out near to Baxter Road which would only likely be apparent for relatively short periods. Works in other areas of the project are not expected to result in Highly Noise Affected noise levels at this receiver due to increased separation distance and screening that would be provided by intervening buildings and structures.

5.5 Other Sensitive Receivers

There are several categories of 'other sensitive' receivers in the study area, including educational facilities, places of worship and hotels.

The predicted NML exceedances for 'other sensitive' receivers are summarised in **Table 39**. The summary is for all NCAs and shows the impacts in bands of 10 dB above the corresponding NML, separately by receiver type. The predicted worst-case impacts at each 'other sensitive' receiver are also shown in **Figure 19**.

Table 39 Overview of 'Other Sensitive' Receiver NML Exceedances

ID	Scenario	Activity	Educational			Medical			Place of Worship			Child Care			Library			Outdoor Areas			Hotels			Hotels		
			Daytime			Daytime			Daytime			Daytime			Daytime			Daytime			Daytime			Night-time		
			1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	3	3	-	1	3	3
1b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	-	-
2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	-	-	-
2b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound Operation		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	4	-	-	2	4	-
4a	Demolition	Peak	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
4b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	4	2	-
5b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
6a	Road Works	Peak	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	1	-	1	2	-	4	1	2
6b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-
6c		Dynamic Comp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-

Figure 19 Predicted Worst-case Impacts – Other Sensitive Receivers

SLR

The assessment of 'other sensitive' receivers shows the following:

- Based on predicted external noise levels, the closest hotels are likely to be subject to 'high' worst-case impacts when noise intensive equipment is being used nearby. The hotels are:
  - Stamford Plaza Hotel in NCA06
  - The future airport hotel in NCA07
  - Mantra Hotel in NCA07.
- A number of hotels are predicted to be subject to 'moderate' worst-case impacts, these include:
  - Ibis Budget Sydney in NCA07
  - Quest Mascot and Citadines Connect Sydney Airport in NCA08.
- The more distant hotels in NCA07 and NCA08 are predicted to have 'minor' or compliant worst-case impacts.
- Coleman Reserve is predicted to have 'high' daytime impacts during the worst-case scenarios and 'moderate' or 'minor' impacts during other works.
- Three child care centres and two places of worship are predicted to have 'minor' worst-case impacts, including:
  - St Peters Anglican Church in NCA01
  - St Peter & St Paul Catholic Church in NCA02
  - Betty Spears Child Care Centre and Guardian Early Learning Centre in NCA03
  - Aero Kids Early Learning Centre in NCA06.
- It is noted that the majority of these 'other sensitive' receivers are adjacent, or near, to major existing roads and are subject to relatively high existing noise levels. The unattended noise monitoring in **Section 2.2** shows existing noise levels next to major roads are in the region of 65 to 75 dB during the daytime and 60 to 70 dB during the night-time, which is comparable to, or higher than, the predicted construction noise levels for many of the assessed work scenarios (see **Appendix D**).

Impacts at Hotels

Certain construction works would at times be required to be completed near to hotels during the night-time. The above assessment shows that when noisy equipment such as rockbreakers or concrete saws are in use the impacts at the nearest hotels near Joyce Drive are likely to be 'high'.

The most affected hotels are, however, expected to have high performance facades and glazing to mitigate high existing noise levels near the airport. This could potentially reduce construction noise impacts to acceptable internal levels during some construction works.

Similar to the assessment of residential impacts, the worst-case noise levels and impacts would only be apparent for relatively short durations of the works when noisy equipment is being used, noting however that regular night-time construction work would likely be required in this area due to the need to maintain the operational function of the road. There would, however, frequently be periods when construction noise levels are much lower than the worst-case levels predicted and there would also be times when no equipment is in use and no impacts occur. The impacts would also be lower than predicted when works are occurring in distant parts of the project site or where they are screened from view.

Further investigation of the potential impacts at hotels should be completed during detailed design. Appropriate criteria should be set which takes into account the existing facade performance of affected hotels and location of noise sensitive facades.

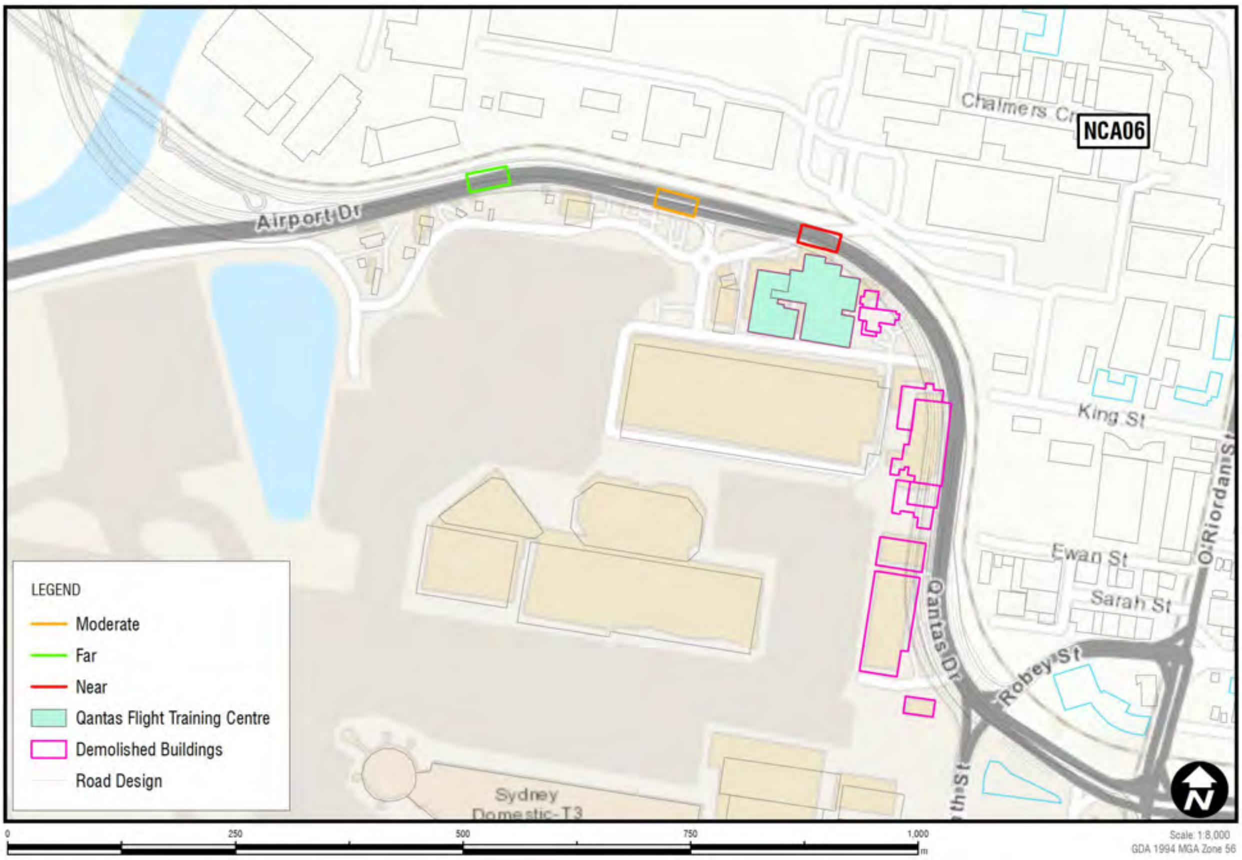
5.5.2 Qantas Flight Training Centre

The Qantas Flight Training Centre is located next to Qantas Drive and is shown in **Figure 20**. The centre provides flight training for pilots and cabin crew and operates 24 hours a day, seven days a week.

The centre has several specialist flight simulators that are required to be kept operational to meet training needs. The simulators are highly sensitive to impacts from construction works as they simulate aircraft warning sounds and events which need to be easily discernible by pilots during training.

Other sections of the centre are used as training rooms, cabin crew simulation areas, pre-flight training areas and meeting/office rooms.

Figure 20 Qantas Flight Training Centre



The Qantas buildings which are to be removed by the project are shown on the figure. These buildings would be removed part way through construction to allow Qantas Drive to be widened.

It is noted that Qantas is proposing to relocate the centre due to its existing lease ending and Sydney Airport requiring the land for future airport development. The proposed location is on King Street in Mascot, which is around 150 metres to the east of the existing centre. Construction of the new centre is proposed to start in the third quarter 2019 and last for 23 months, meaning there could be a period where construction works for Sydney Gateway road project potentially affect the existing centre.

Assessment of Construction Impacts

Construction noise levels have been predicted at the centre for construction scenarios which are likely to occur nearby on Qantas Drive. A summary of the predictions is shown in **Table 40** with detailed noise level predictions provided in **Appendix D**. The following three works areas have been assessed:

- Works directly outside the centre (see the 'near' location in **Figure 20**)
- Works around 100 metres to the west of the centre (see the 'moderate' location in **Figure 20**)
- Works around 300 metres to the west of the centre (see the 'far' location in **Figure 20**).

Table 40 Predicted Construction Noise Exceedances – Qantas Flight Training Centre[1]

Period	ID	Scenario	Activity	Near (works outside centre)	Moderate (works ~100 m away)	Far (works ~300 m away)
When in Use	1a	Enabling Works (inc. utilities)	Peak	■	◆	●
	1b		Typical	◆	·	·
	3a	Site Establishment		■	●	·
	4a	Demolition	Peak	■[2]	-	-
	4b		Typical	◆[2]	-	-
	6a	Road Works	Peak	■	●	·
	6b		Typical	◆	·	·
	7a	Finishing Works		◆	·	·
Key to Impacts		● Marginal to minor (1 to 10 dB)		◆ Moderate (11 dB to 20 dB)		■ High (>20 dB)

Note 1: Assessed as an educational receiver with an internal noise criterion of 45 dBA and assuming a conservative 10 dB difference between internal and external noise levels.

Note 2: Demolition works have only been assessed as being at the adjacent building to the east of the Qantas Training Centre.

The above assessment shows that for the Qantas Training Centre:

- When works are immediately adjacent, 'Peak' construction scenarios are likely to result in 'high' worst-case impacts when noise intensive equipment such as rockbreakers or concrete saws are being used. Noise levels and exceedances during the 'Typical' works, when noise intensive equipment is not in use, are predicted to be significantly lower with the impact reduced to 'moderate'.
- Demolition of the adjacent building is likely to result in the highest noise impact, if rockbreakers are used.
- For works which are around 100 metres away, the majority of the assessed scenarios result in compliant or 'minor' worst-case impacts. 'Peak' *Enabling Works* are predicted to result in 'moderate' impacts when rockbreakers or concrete saws are being used. 'Typical' *Enabling Works* are predicted to be compliant.

- When works are around 300 metres from the centre the noise levels are predicted to be compliant except during 'Peak' *Enabling Works* where the impact is expected to be 'minor' when rockbreakers or concrete saws are used.
- The impacts presented above are based on all equipment working simultaneously in each assessed scenario. There would frequently be periods when construction noise levels are much lower than the worst-case levels predicted and there would be times when no equipment is in use and no impact would occur. Works in distant parts of the project are expected to be compliant with the NMLs.
- While there would likely be periods of 'high' impact when noise intensive works are nearby, it should be recognised that the centre is under a flight path and next to a major road. Existing noise levels were monitored close to the centre (see **Section 2**) and 15 minute average daytime noise levels are regularly between 70 to 75 dBA, with maximum noise levels often being above 100 dBA. When works are outside, the predicted worst-case 'Peak' construction noise levels typically range from 75 to 90 dB (see **Appendix D**), with the 'Typical' worst-case noise levels ranging from 70 to 75 dBA. When works are around 100 metres away, the worst-case impacts are lower and predicted to be less than 70 dBA.

Consultation with Qantas and Sydney Airport has been undertaken during the preparation of the EIS. The management strategy for minimising any impacts would be further developed with Qantas and Sydney Airport as detailed construction planning information becomes available.

Ground-borne Noise and Vibration

There is potential for ground-borne noise and vibration impacts at the centre when construction works requiring vibration intensive equipment such as rockbreakers or vibratory rollers are nearby. Vibration intensive equipment would likely be required in close proximity to the centre at certain times, such as during demolition of the adjacent building or during works for widening of Qantas Drive.

The centre would likely be impacted by ground-borne noise, depending on when vibration intensive works occur in relation to Qantas' proposed relocation. Impacts are expected to be 'high' when items such as rockbreakers are being used outside the centre, however, when the works are around 100 metres away the ground-borne noise levels would be much lower and likely compliant with the management levels.

The centre is also within both the cosmetic damage and human comfort minimum working distances shown in **Figure 25**, meaning vibration impacts may also be apparent when works are outside. The centre has several specialist flight simulators and other equipment which may be sensitive to vibration impacts when vibration intensive construction equipment is in use nearby.

The requirement for vibration intensive works in this location should be reviewed during detailed design when detailed construction planning details are known. Where impacts are considered likely alternative means of demolition which avoid hydraulic/pneumatic hammering could be used, such as shear, pulveriser or ripper attachments to excavators. This would have the benefit of reducing airborne noise, ground-borne noise and potential vibration impacts on the centre.

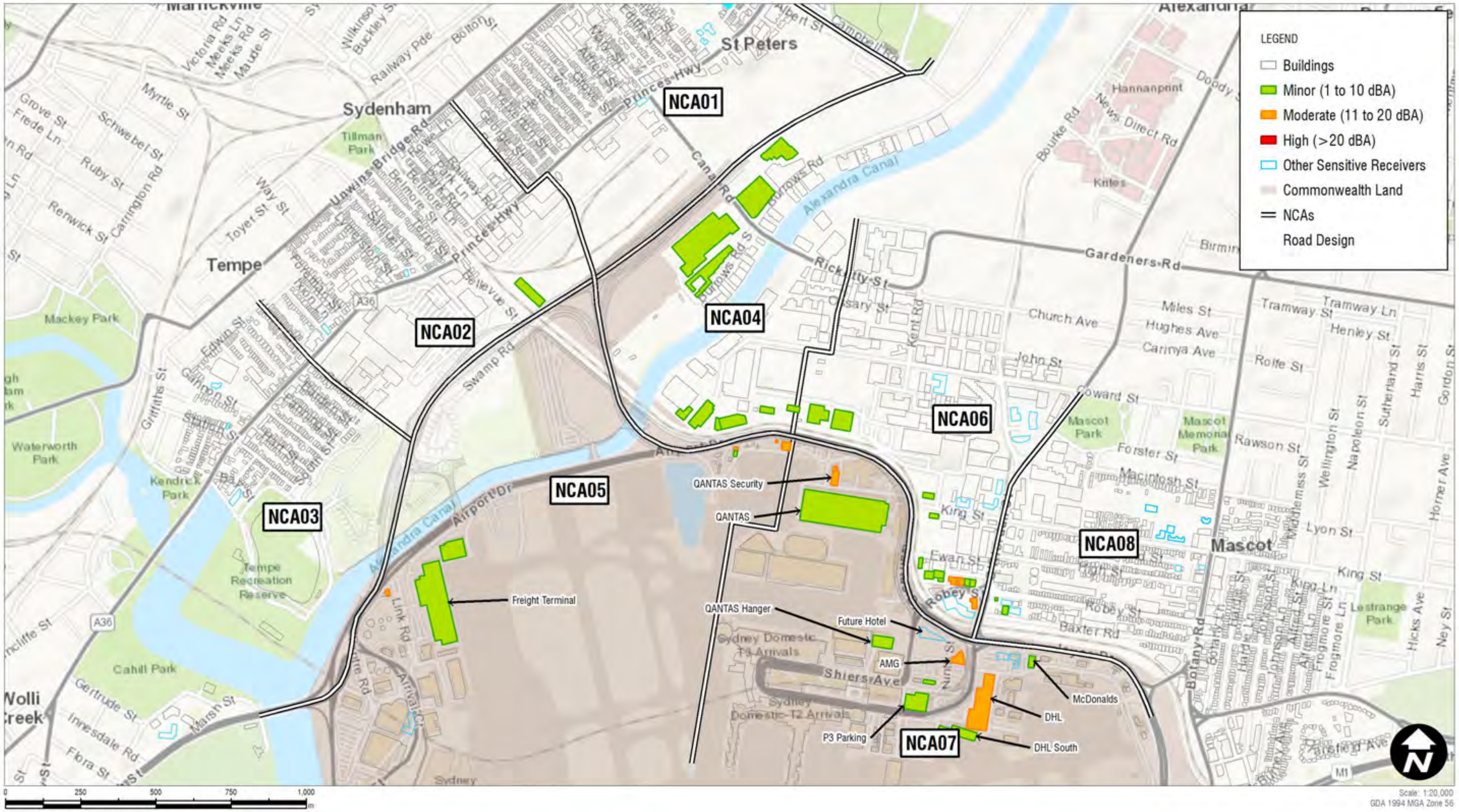
5.6 Commercial Receivers

A summary of the predicted construction noise impacts in each NCA for commercial receivers is presented in **Table 41** and shown in **Figure 21**. Noise level predictions are provided in **Appendix D**.

Table 41 Predicted Construction Noise Exceedances – Commercial Receivers

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
When in Use	1a	Enabling Works (inc. utilities)	Peak	•	•	●	•	●	◆	◆	◆	●
	1b		Typical	•	•	•	•	•	•	•	•	•
	2a	Compound Establishment	Peak	•	•	•	•	●	•	●	●	•
	2b		Typical	•	•	•	•	•	•	•	•	•
	2c	Compound Operation		•	•	•	•	•	•	•	•	•
	3a	Site Establishment		•	•	•	•	●	●	●	●	•
	4a	Demolition	Peak	•	•	•	•	●	•	●	◆	•
	4b		Typical	•	•	•	•	•	•	•	•	•
	5a	Bridges	Peak	•	•	•	•	●	•	•	●	•
	5b		Typical	•	•	•	•	•	•	•	●	•
	6a	Road Works	Peak	•	•	●	•	◆	◆	◆	●	•
	6b		Typical	•	•	•	•	●	•	•	•	•
	6c		Dynamic Compaction	•	•	•	•	•	•	•	•	•
	7a	Finishing Works		•	•	•	•	●	•	•	•	•
Key to Impacts		● Marginal to minor (1 to 10 dB)		◆ Moderate (11 dB to 20 dB)				■ High (>20 dB)				

Figure 21 Predicted Worst-case Impacts at Commercial Receivers



SLR

The above assessment shows that for commercial receivers:

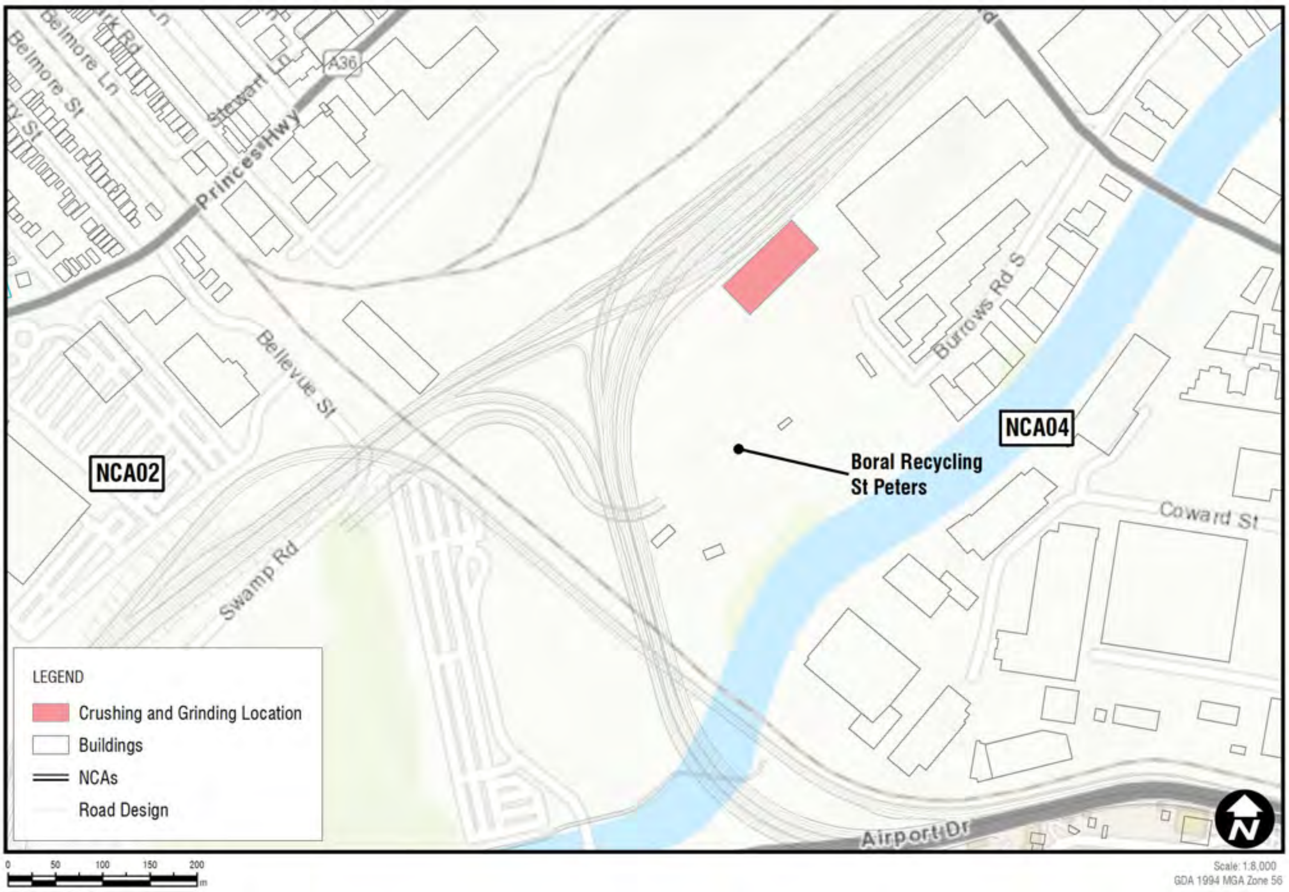
- 'Moderate' worst-case impacts are predicted at the nearest commercial receivers in NCA05, NCA06 and NCA07, during some of the 'Peak' works scenarios when noise intensive equipment is in use
- Noise levels and exceedances during the 'Typical' works, when no noise intensive equipment is being used, are significantly lower and mostly compliant with the NMLs
- No commercial receivers are predicted to be subjected to 'high' impacts
- The impacts on Commonwealth land are predicted to generally result in 'minor' impacts, however, a number of commercial buildings which are located close to works areas (including DHL, the AMG showroom and Qantas Security) may experience 'moderate' impacts during the noisiest works.

The impacts presented above are based on all equipment working simultaneously in each assessed scenario. There would frequently be periods when construction noise levels are much lower than the worst-case predictions and there would be times when no equipment is in use and no exceedances occur.

5.7 Crushing and Grinding Area

The project would require an area dedicated to crush and grind material brought to site so it is suitable for use as engineering fill. The indicative location is shown in **Figure 22**. It is noted that crushing and screening already occurs near this location at Boral Recycling St Peters which is to the immediate south-west of the proposed location.

Figure 22 Crushing and Grinding Indicative Location



The construction equipment required would likely include a rock crusher, front end loader, excavator and trucks. The area would only be in use during Standard Construction Hours.

5.7.1 Potential Impacts

A summary of the predicted construction noise impacts in each NCA for the nearest receivers is shown in **Table 42**. Detailed noise level predictions are provided in **Appendix D**.

Table 42 Predicted Worst-case Construction Noise Exceedances – Crushing and Grinding

ID	Receiver Type	Period	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
CG1	Residential	Daytime	•	•	•	•	•	•	•	•	•
	Commercial	Daytime	•	•	•	•	•	•	•	•	•

Key to Impacts ● Marginal to minor (1 to 10 dB) ◆ Moderate (11 dB to 20 dB) ■ High (>20 dB)

The above assessment shows that noise levels from crushing and grinding are predicted to be compliant during the daytime at the nearest receivers, which is due to the separation distance from the works to the nearest receivers.

5.8 Impact Piling

Impact piling would be required during the construction of new bridge piers (see **Figure 6** and **Figure 7** for the location of bridges). Impact piling can generate high noise and vibration levels, however, it is generally only required for relatively short durations and the works would be completed during Standard Construction Hours, where possible. Piling at a number of the sites may, however, penetrate the OLS, meaning periods of night-time works would also likely be required.

The predicted worst-case airborne noise impacts are shown in **Figure 23** during daytime Standard Construction Hours and in **Figure 24** for Out of Hours Works during the night-time. Detailed noise level predictions are provided in **Appendix D**.

Figure 23 Impact Piling – Daytime, Standard Construction Hours

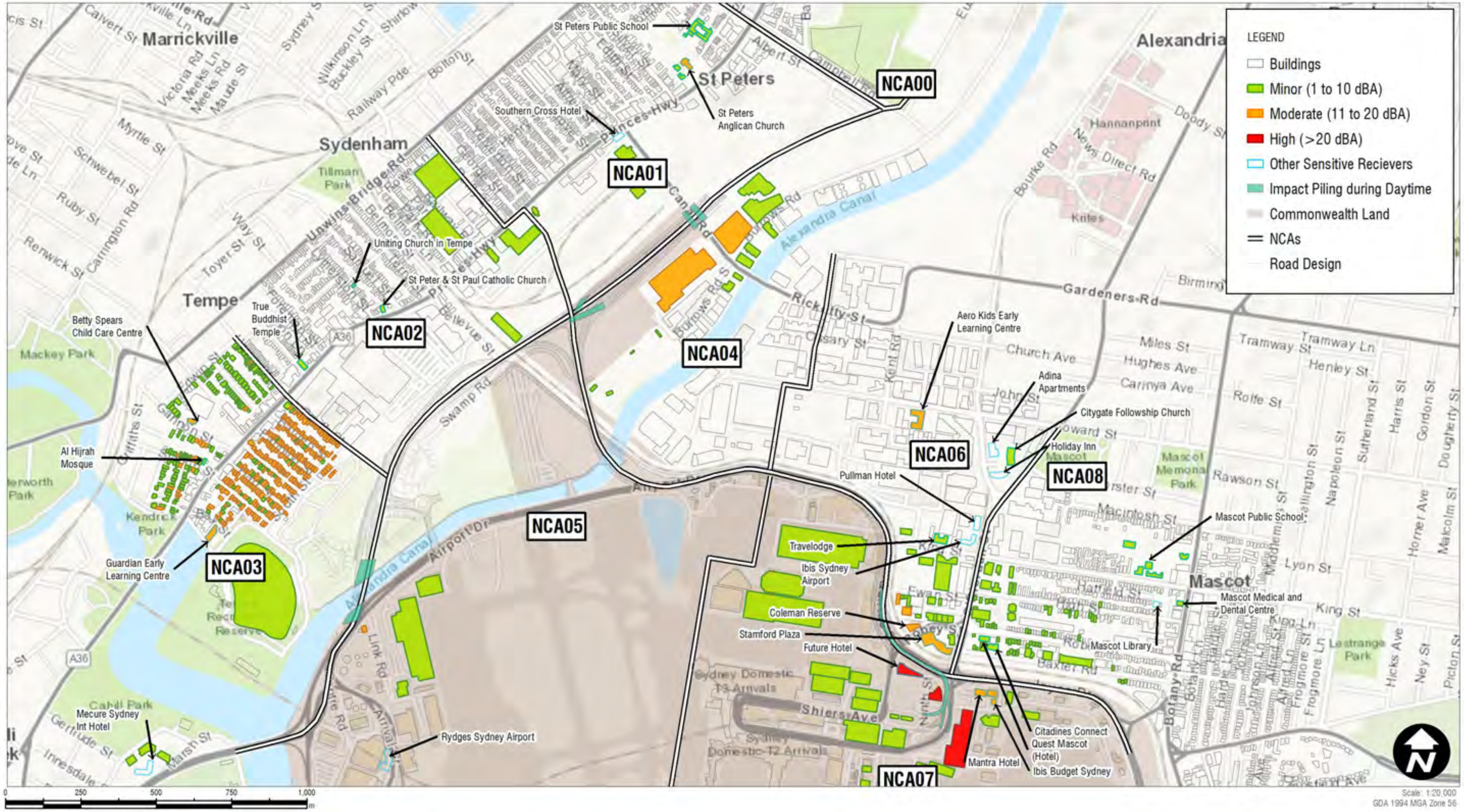
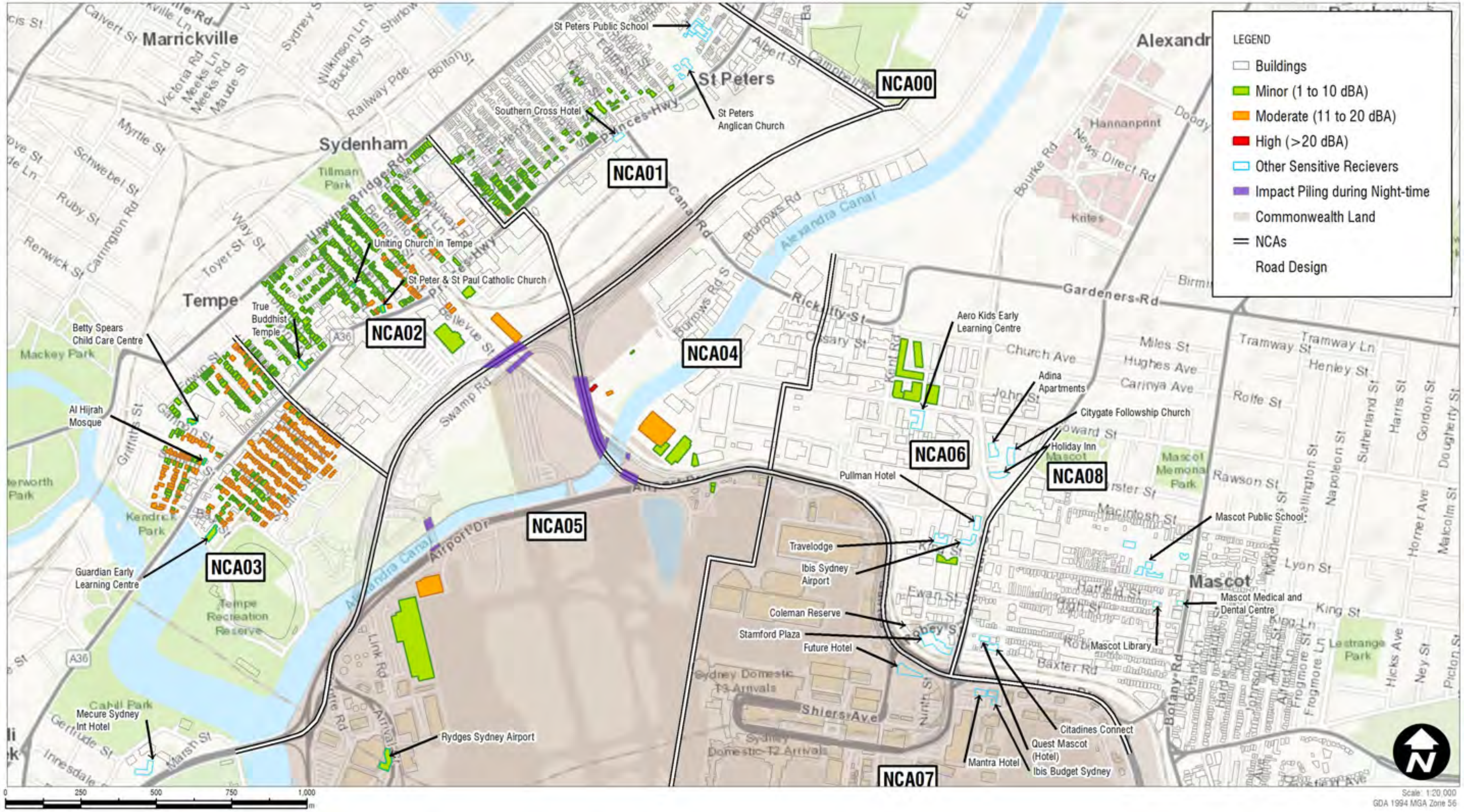


Figure 24 Impact Piling – Night-time, Out of Hours Works



SLR

The above assessment shows the following impacts are expected during impact piling:

- During the daytime, the nearest receivers are predicted to generally have 'moderate' worst-case impacts. A small number of receivers which are close to the piling locations may be subject to 'high' impacts, including two commercial buildings, and the Sydney Airport future hotel site near the intersection of Joyce Drive and O'Riordan Street in NCA07.
- Where night-time works are required, the predicted worst-case impacts at the nearest receivers are also typically predicted to be 'moderate'. Some of the nearest receivers are of commercial use, however, many residential receivers in Tempe in NCA03 are predicted to be affected during piling for the new bridge over Alexandra Canal.

5.9 Sleep Disturbance

A sleep disturbance screening assessment has been undertaken for the construction works and a summary is provided in the assessment tables in **Appendix D**. Review of the predictions shows that the sleep disturbance screening criterion is likely to be exceeded when night works occur near residential receivers. The receivers which would potentially be affected by sleep disturbance impacts are generally the same receivers where 'high' night-time impacts have been predicted (see **Section 5.1** to **5.3**).

The requirements for night-time works would be confirmed as the project progresses. Construction mitigation and management measures are discussed further in **Section 8.1**.

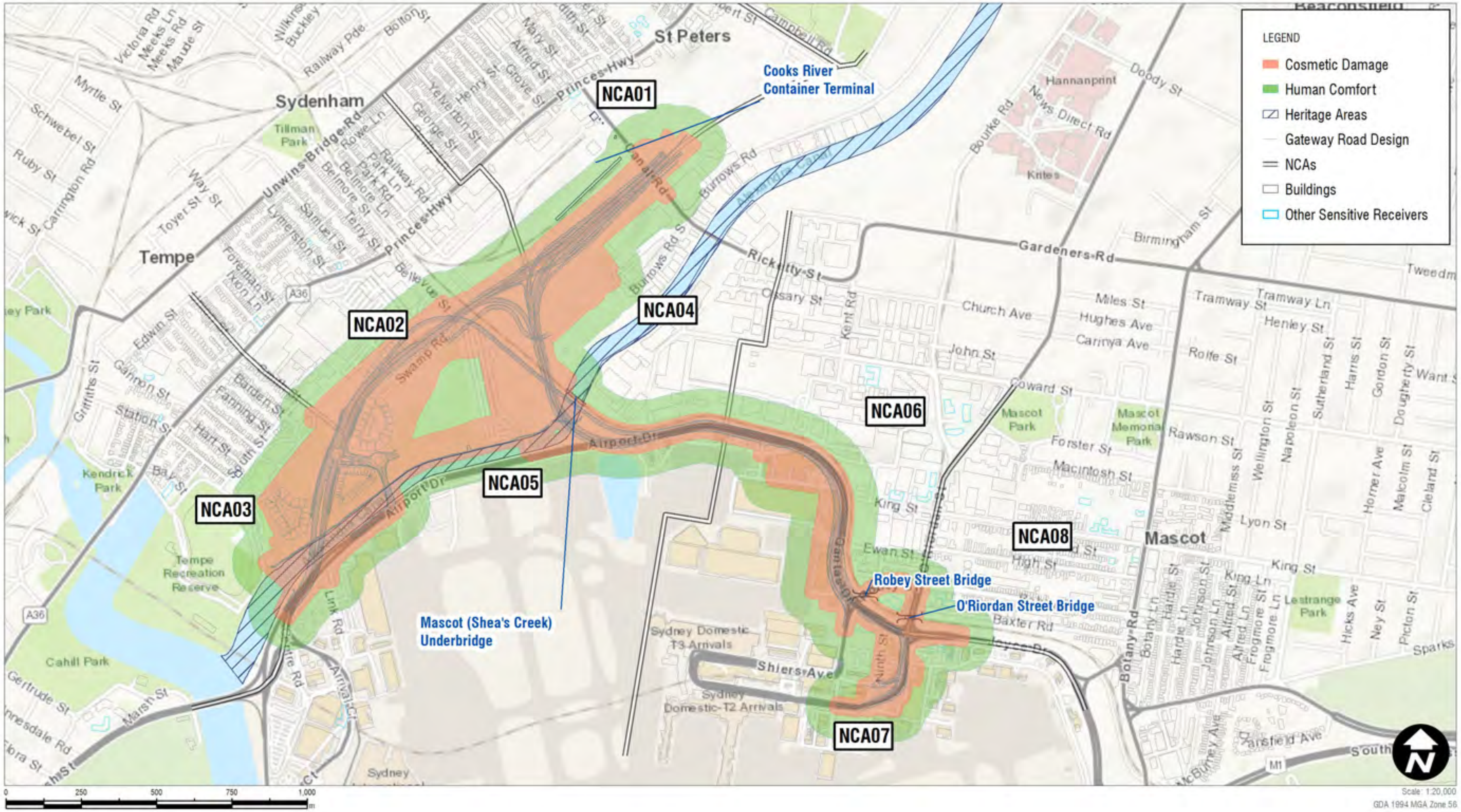
5.10 Construction Vibration Assessment

The main potential sources of vibration during construction are from vibratory rollers, rockbreakers, vibratory piling, impact piling and during dynamic compaction.

Vibration offset distances have been determined from the CNVG minimum working distances for cosmetic damage and human response in **Table 18**. The assessment assumes that a 13–18 tonne vibratory roller and a large rockbreaker are required in the appropriate construction scenarios (see **Figure 6**, **Figure 7** and **Appendix D**) and the assessment is summarised in **Figure 25** and **Figure 26**.

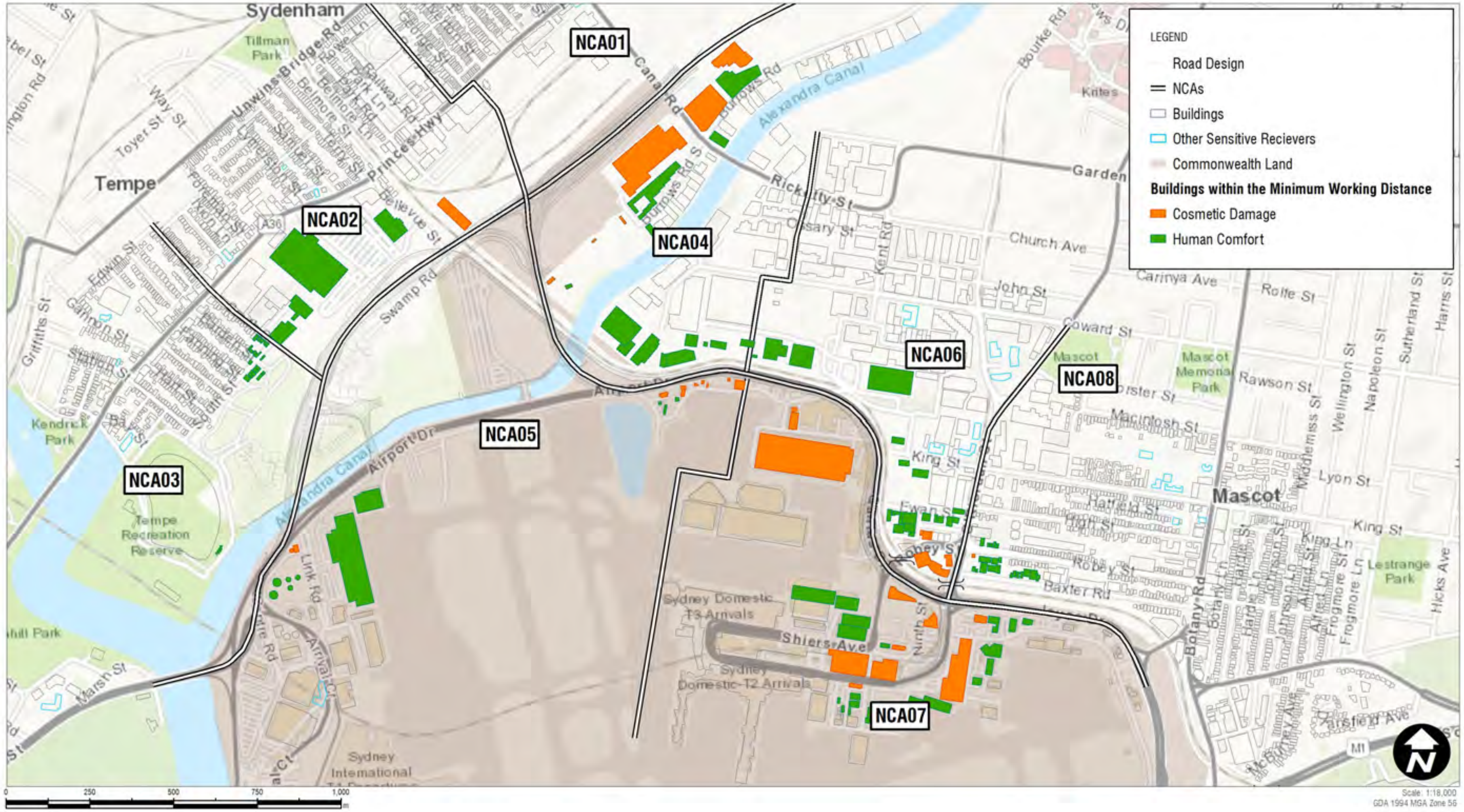
It is, however, noted that the local ground conditions in the study area (ie fill layers on sand) would likely reduce the transmission of vibration when compared to rock, potentially resulting in lower vibration levels at the affected receivers than presented.

Figure 25 Construction Vibration Assessment – Minimum Working Distances



SLR

Figure 26 Construction Vibration Assessment – Buildings within Minimum Working Distances



Note: The CNVG minimum working distances are based on residential criteria for human comfort. Non-residential buildings may be less sensitive than shown.

5.10.1 Cosmetic Damage Assessment Summary

The above figures show that the distance between the construction works and the nearest receivers is generally sufficient for most buildings to be unlikely to suffer cosmetic damage.

Some buildings and structures are, however, within the recommended minimum working distances, particularly in the eastern section of the study area, near Airport Drive and Qantas Drive, where receivers in NCA06, NCA07 and NCA08 are located close to the works.

A number of items are also within the cosmetic damage minimum working distances in NCA01 near to Burrows Road south and in NCA05 to the south of Airport Drive.

Impact piling would be required at bridges and can generate high vibration levels. The CNVG does not provide a cosmetic damage minimum working distance for this activity. Vibration levels from impact piling depend on the weight of the hammer and drop height which is currently unknown, however, given the proximity of certain buildings and structures to the bridges, particularly near the new Qantas Drive viaduct to Sydney Airport Terminal 2/3, there is potential for cosmetic damage impacts from this activity.

5.10.2 Human Comfort Vibration Assessment

Certain receivers in the study area are within the human comfort minimum working distance shown in **Figure 25** and occupants of affected buildings may be able to perceive vibration impacts at times when vibration intensive equipment is in use. Where impacts are perceptible, they would likely only be apparent for relatively short durations when equipment such as rockbreakers or vibratory rollers are nearby.

Impact piling can also result in human comfort vibration impacts. The CNVG does not provide a human comfort minimum working distance for this activity. The extent of the impacts would depend on the size of the equipment used. The proximity of sensitive receivers to some of the locations where impact piling would be required means human comfort impacts are likely at times during the works.

5.10.3 Heritage Structures

Heritage buildings and structures that have been identified in the study area are shown in **Figure 25**. The heritage items which are within the cosmetic damage minimum working distance are shown in the figure and also listed in **Table 43**.

Table 43 Heritage Items Identified within Cosmetic Damage Minimum Working Distance

NCA	Item	Location
NCA01	Cooks River Container Terminal, including the electrical overhead travelling crane and precast concrete hut 2	West of Canal Road
NCA03, NCA04 & NCA05	Alexandra Canal (including sandstone embankment)	Alexandra Canal, Mascot
NCA04	Mascot (Sheas Creek) Underbridge	Extends over Alexandra Canal, Mascot
NCA06	Robey Street Bridge	Extends over Robey Street, Mascot
NCA06 & NCA08	O'Riordan Street Bridge	Extends over O'Riordan Street, Mascot

BS 7385 states that *"a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive"* and therefore buildings or structures should not be assumed to be sensitive to vibration on the basis of being a heritage item alone.

The above assessment has identified five heritage items which are within the cosmetic damage minimum working distance. It is noted that three of the heritage items are rail bridges and are not expected to be overly sensitive to potential vibration impacts from nearby construction works.

Sections of Alexandra Canal and Cooks River Container Terminal are within the minimum working distances and could be susceptible to damage when vibration generating construction works are nearby.

5.10.4 Pipelines

There are several pipelines in the project site, including:

- Jemena Primary and Secondary Gas Mains
- Qenos Ethylene Pipeline
- Fuel Pipelines
- Airport Water Supply Line
- Sydney Desalination Pipeline.

Vibration intensive activities, such as rockbreaking, vibratory rolling or vibratory/impact piling, may occur near these pipelines at certain times during construction of the project.

Vibration criteria for buried pipework range from 50 mm/s to 100 mm/s (see **Table 16**) depending on the pipe material. At this early stage in the project it is unclear as to the condition of the various pipes and it may be necessary to reduce the criteria to prevent minor damage. Vibration from construction equipment may exceed the criteria depending on the distance of the works to the pipelines, the type of equipment used and the intervening ground conditions.

The susceptibility of the various assets to vibration levels and appropriate monitoring and management protocols should be developed in consultation with the relevant owners during detailed design.

5.10.5 Vibration Mitigation

Based on experience with other similar road project in Sydney, it is expected that vibration impacts would be able to be controlled to avoid cosmetic damage to all buildings and structures.

Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives:

- Different construction methods with lower source vibration levels should be investigated and implemented, where feasible
- Attended vibration measurements should be undertaken at the start of the works to determine the actual vibration levels at the nearest receivers or structures. Work should cease if the monitoring indicates vibration levels are likely to exceed the relevant criteria (see **Section 3.2.2.4**).

Where buildings or structures are potentially affected by vibration, condition surveys should be completed before and after the works.

The potential for cosmetic damage and human comfort impacts from construction vibration should be reviewed during detailed design when finalised information regarding the works is available. A detailed assessment of impact piling should be completed.

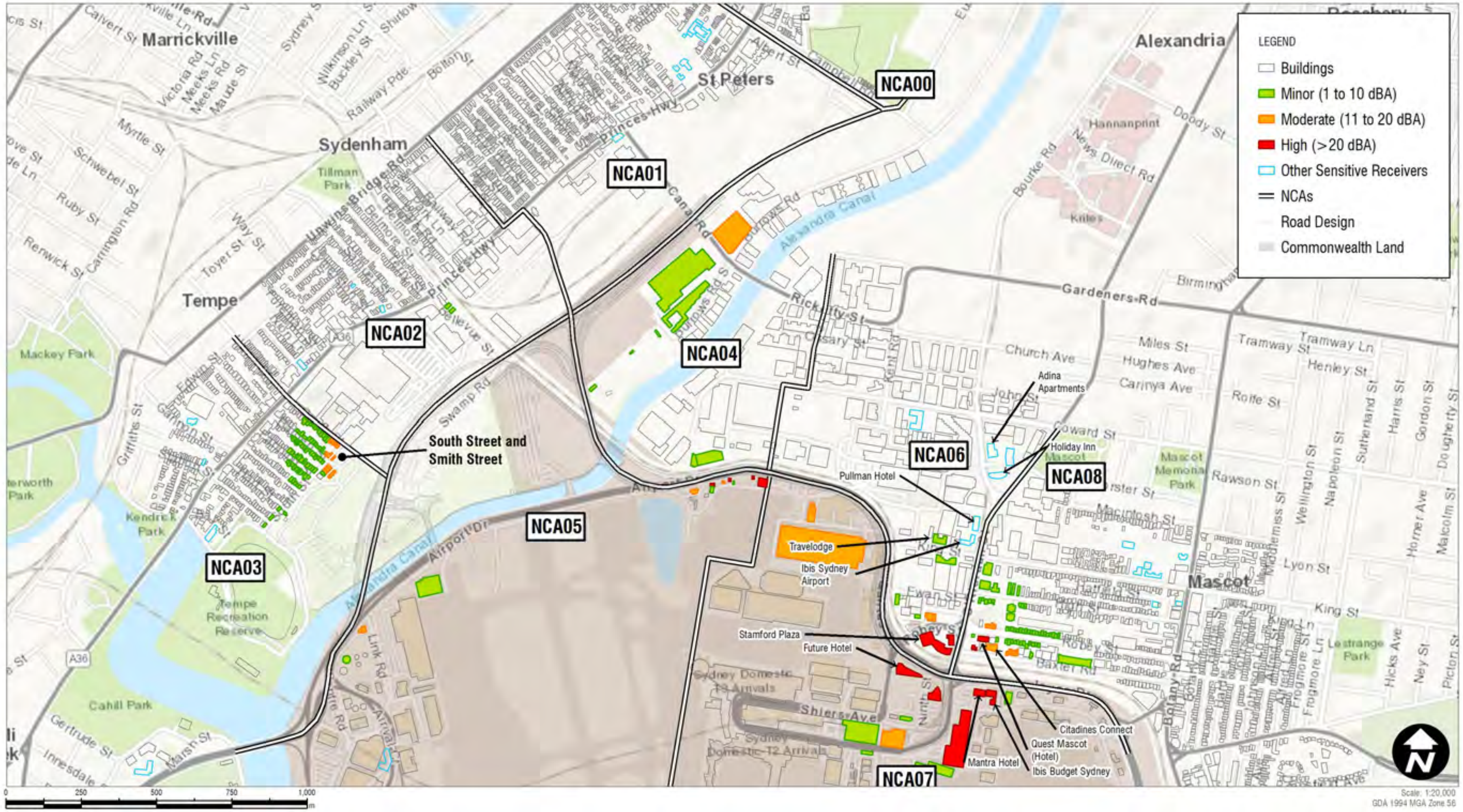
Vibration mitigation measures are discussed further in **Section 8.1**.

5.11 Construction Ground-borne Noise

Construction works can cause ground-borne noise impacts in nearby buildings when vibration generating equipment is in use. Ground-borne noise impacts should be considered where ground-borne noise levels are higher than noise transmitted through the air, such as where buildings near to construction works have high performing facades which attenuate the airborne component.

Ground-borne noise impacts have been predicted to the receivers in the study area. The assessment assumes a large rockbreaker is required in the appropriate construction scenarios (see **Figure 6**, **Figure 7** and **Appendix D**) and the assessment is summarised in **Figure 27**.

Figure 27 Construction Ground-borne Noise Assessment – Large Rockbreaker



Note: The assessment assumes vibration propagation through rock. Where the ground conditions are compacted soil/sand, the ground-borne noise levels would be lower than shown.

The above figure shows the majority of receivers in the study area are sufficiently distant from the works for ground-borne noise impacts to be minimal. Residential receivers near South and Smith Street are predicted to have 'moderate' to 'minor' worst-case ground-borne noise impacts, however, airborne noise levels would likely be dominant over the ground-borne component for construction works in this area.

Several hotels are located close to the project site and due to their expected high facade and glazing performance, would potentially have 'high' or 'moderate' ground-borne noise impacts when rockbreakers are in use nearby. The potentially affected hotels are:

- Stamford Plaza Hotel in NCA06
- The Mantra Hotel, Ibis Budget Sydney and the future airport hotel site in NCA07
- Quest Mascot and Citadines Connect Sydney Airport in NCA08.

A number of commercial buildings near the Joyce Drive and O'Riordan Street intersection, and along Qantas Drive, would potentially also be subject to 'high' impacts.

The extent of impacts at these receivers would be dependent on the requirement for vibration generating works in these areas, the location of sensitive areas inside each building relative to the works and the existing facade performance.

The likelihood of ground-borne noise impacts should be reviewed during detailed design when detailed construction planning information is available. A review of the existing facade performance of the affected hotels and other receivers, where appropriate, should be completed to allow appropriate external noise level criteria to be determined.

5.12 Construction Traffic Noise Assessment

Construction related traffic has the potential to temporarily increase road traffic noise levels at receivers which are adjacent to construction haulage routes.

The forecast construction traffic volumes in the study area have been used to determine where potentially noticeable increases in road traffic noise (ie a greater than 2.0 dB increase above the existing noise level) is likely. The assessment is summarised in **Figure 28**.

Figure 28 Construction Traffic Assessment – Predicted Change in Road Traffic Noise Levels

The above assessment indicates that construction traffic is unlikely to result in a noticeable increase in noise levels on the proposed construction haulage routes. This results from the high existing volumes of traffic that currently use these routes compared to the relatively small volume of construction vehicles.

5.13 Summary of Construction Impacts on Commonwealth Land

The potential construction impacts on Commonwealth land would generally be limited to NCA05 and NCA07. These areas are mostly commercial use, however, there are three existing hotels (Rydges Sydney Airport in NCA05 together with Mantra Hotel and Ibis Budget Sydney Airport in NCA07) and a future hotel located near the intersection of Qantas Drive and O'Riordan Street. The Qantas Flight Training Centre is also on Commonwealth land, located to the south of Qantas Drive in NCA07.

Hotels

The potential construction impacts on the hotels on Commonwealth land are assessed in **Section 5.5**. The assessment indicated that 'high' or 'moderate' worst-case impacts are likely when construction works which use noise intensive equipment such as rockbreakers or concrete saws are outside these receivers. Impacts would be much lower during typical works when noise intensive equipment isn't in use, with noise levels likely being compliant or only resulting in 'minor' impacts.

The hotels are expected to have high performance facades and glazing to mitigate high existing noise levels near Sydney Airport. This could potentially reduce construction noise impacts to acceptable internal levels during most of the construction works. Further investigation of facade performance should be undertaken as the project progresses with the aim of setting appropriate external criteria which accounts for the existing facade performance.

Qantas Flight Training Centre

The potential impacts on the Qantas Flight Training Centre are assessed in **Section 5.5.2**. The assessment indicated that 'high' worst-case impacts are likely when construction works using noise intensive equipment are immediately outside the centre.

Where works are more distant and located around 300 metres away, the impacts are predicted to generally be compliant with the Noise Management Levels, with only a 'minor' impact predicted during one scenario which represents the noisiest works.

The assessment noted that parts of the centre are highly sensitive to noise and vibration impacts. Consultation with Qantas and Sydney Airport has been undertaken during the preparation of the EIS. The strategy for minimising these impacts would be developed with Qantas and Sydney Airport as detailed construction planning information becomes available.

Commercial Receivers

The potential construction noise impacts on commercial receivers on Commonwealth land are assessed in **Section 5.6**. In summary, construction of the project is predicted to generally result in 'minor' worst-case impacts at commercial receivers, however, a number of commercial buildings that are located close to works areas (including DHL, the AMG showroom and Qantas Security) may have 'moderate' impacts during the noisiest works.

It is noted that commercial receivers on Commonwealth land are adjacent, or near to, major existing roads and Sydney Airport and are subject to relatively high existing noise levels. The unattended noise monitoring in **Section 2.2** shows existing noise levels in this area are in the region of 70 dBA during the daytime and night-time, which is comparable to, or higher than, the predicted construction noise levels for many of the assessed work scenarios.

The assessment includes the demolition of buildings adjacent to Qantas Drive. The removal of these buildings would result in certain buildings at the Qantas Terminal having line of sight to construction works on Qantas Drive and experiencing higher construction noise levels than they otherwise would with the buildings in place.

Ground-borne Noise and Vibration

Construction ground-borne noise and vibration impacts are assessed in **Section 5.11** and **Section 5.10**, respectively. Certain buildings on Commonwealth land would likely be affected by ground-borne noise when vibration intensive works are nearby. Similarly, certain buildings would be within the minimum working distances for human comfort and cosmetic damage, meaning there is potential for vibration impacts when works are close to these receivers.

The requirement for vibration intensive works near to buildings on Commonwealth land should be reviewed during detailed design when detailed construction planning information is available.

Mitigation

Construction mitigation measures are discussed in **Section 8.1**.

Significance of Impacts

The *Environmental Protection and Biodiversity Conservation Act 1999* (the EPBC act) requires projects on Commonwealth land to determine if the outcomes of the project are likely to have a significant impact on the environment. A ‘significant’ impact is one which is important, notable, or of consequence, having regard to its context or intensity. Whether or not impacts are significant depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

The process outlined in the EPBC act Significant impact guidelines 1.2 has been followed to determine if construction of the Sydney Gateway road project on Commonwealth land would likely have a significant impact.

Many of the receivers on Commonwealth land are commercial use with relatively low sensitivity. While certain sensitive receivers are likely to be highly impacted at times during the construction works, including a number of hotels at the Joyce Drive and O’Riordan Street intersection, the number of affected receivers is relatively small and the impacts would be reduced as far as practicable through the use of all available feasible and reasonable mitigation and management measures. Existing noise levels around Sydney Airport are also high with most areas affected by transportation traffic noise from nearby major roads and the Botany Rail Line, and aircraft noise from Sydney Airport. Overall, for a major infrastructure project in an urban area the impacts are considered manageable and therefore not significant.

5.14 Consistency with the Sydney Airport Master Plan 2039 and Environment Strategy 2019-2024

The Sydney Airport Master Plan 2039 (Section 14.6.4 – Ground-based Noise) and the Environmental Strategy 2019–2024 (Section 3.5 – Ground-based noise) note that construction noise from developments at the airport are assessed at the development approval stage.

Both documents set out several strategies that are used to manage and reduce airport ground-based noise, which in this context includes construction noise such as from the Sydney Gateway road project. The following are considered relevant to construction of the project:

- Continue to undertake regular monitoring of ground-based noise sources at the airport
- Continue to ensure that ground-based noise is assessed and managed for the construction and operational phases of development proposals
- Carry out ground-based operational noise modelling for major developments impacting airport operations, assess noise predictions against relevant criteria and develop appropriate noise management measures
- Continue to monitor ground-based noise complaints at the airport.

The assessment of construction of the Sydney Gateway road project in **Section 5** and the recommendations for mitigating potential construction impacts from the project in **Section 8.1** are consistent with the above documents.

6 Assessment of Operational Impacts

6.1.1 Summary of Key Findings

Operational Road Traffic

- Many receivers in the study area are already subject to relatively high existing operational road traffic noise impacts which already exceed the NCG criterion in many cases.
- The project would, however, introduce new sources of road traffic noise to some areas of the project, with substantial increases in road traffic noise levels (ie greater than 2 dB) being predicted in certain areas, including:
  - NCA01 – to the north of Princes Highway, where the project is predicted to result in increases of up to 5 dB
  - NCA03 – receivers in Tempe to the north of Tempe Recreation Reserve, where increases of up to 13 dB are predicted.
- In other areas of the project, increases due to widening works and increased traffic volumes are predicted, including:
  - NCA06 and NCA07 – receivers near the Joyce Drive and O'Riordan Street intersection, where increases of up to 4 dB are predicted
  - NCA08 – on Baxter Road, where increases of up to 3 dB are predicted.
- A total of 246 receiver buildings (359 individual floors) are predicted to have exceedances of the NCG operational road traffic noise criteria and are therefore eligible for consideration of 'additional noise mitigation'.

Ground-based Airport Noise

- Aircraft related ground-based operational noise impacts from Sydney Airport are predicted to increase in the following locations:
  - In NCA03 – receivers in Tempe to the north of Tempe Recreation Reserve, where for the assessed scenarios, noise levels are predicted to increase by between 1 and 3 dB at residential receivers due to the removal of shipping containers at Tyne Containers.
  - In NCA06 and NCA08 – receivers near to O'Riordan Street, in Mascot, where the demolition of several airport buildings adjacent to Qantas Drive is predicted to increase noise levels for receivers to the east by up to 16 dB for the assessed scenarios. The majority of this area is commercial, however, a number of sensitive receivers (hotels and one residential apartment block) would also potentially be affected.

6.2 Operational Road Traffic Noise

Operational road traffic noise impacts 'without mitigation' have been predicted for all sensitive receivers in the assessment area for the project (see **Section 4.4.5**). The operational impacts are discussed in the following sections.

6.2.1 Residential Receivers

The predicted operational road noise levels at residential receivers are summarised in **Table 44** for the 2026 at-opening and 2036 future design scenarios. The table shows the worst-case impacts in each NCA, which are typically for receivers nearest to the project site.

The impacts from the project are predicted to be greatest in the 2036 future design scenario due to this timeframe generally having higher traffic volumes than in 2026 at project opening. Receivers are generally most affected by the project in the night-time period in 2036 and this scenario is considered to control the assessment in terms of determining the worst-case impacts and requirements for mitigation.

The predicted noise levels for the controlling 2036 night-time scenario are shown in **Figure 29** and the predicted change in noise levels (Build (with project) minus No Build (without project)) for the same scenario is in **Figure 30**.

The impacts at all residential receivers are also shown in scatter graphs in **Figure 31** and **Figure 32**, which show the predicted night-time noise levels and the change in noise level in 2036, respectively. Receivers which are triggered for consideration of noise mitigation are coloured on the scatter graphs, noting that for a receiver to be triggered it must meet one of the three NMG triggers shown in **Section 4.4.9**.

Detailed noise predictions at triggered receivers are in **Appendix E** together with operational road traffic noise contours.

Table 44 Predicted Road Traffic Noise Levels at Most Affected Residential Receivers in each NCA

NCA	Predicted Noise Level (dBA)[1]								Number of Triggered Buildings[2]			
	At Opening (2026)				Future Design (2036)							
	No Build (without project)		Build (with project)		No Build (without project)		Build (with project)					
	Day	Night	Day	Night	Day	Night	Day	Night	Trigger 1 >2.0 dB	Trigger 2 Cumulative	Trigger 3 Acute	Total
NCA00	76	73	76	73	77	73	76	73	-	1	8	9
NCA01	59	54	60	56	59	55	60	57	71	12	-	78
NCA02	61	57	63	59	61	58	63	60	2	1	-	2
NCA03	51	47	62	58	49	45	61	58	119	19	-	119
NCA04[3]	-	-	-	-	-	-	-	-	-	-	-	-
NCA05[3]	-	-	-	-	-	-	-	-	-	-	-	-
NCA06	63	60	65	62	63	59	66	63	1	1	1	1
NCA07[3]	-	-	-	-	-	-	-	-	-	-	-	-
NCA08	67	64	69	66	67	64	70	67	22	-	-	22
											Total	**231**

Note 1: Daytime and night-time are $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ noise levels, respectively.

Note 2: The NMG triggers are discussed in **Section 4.4.9**.

Note 3: NCA does not contain residential receivers.

Figure 29 Worst-case Predicted Operational Noise Levels (2036 Night-time, Build)

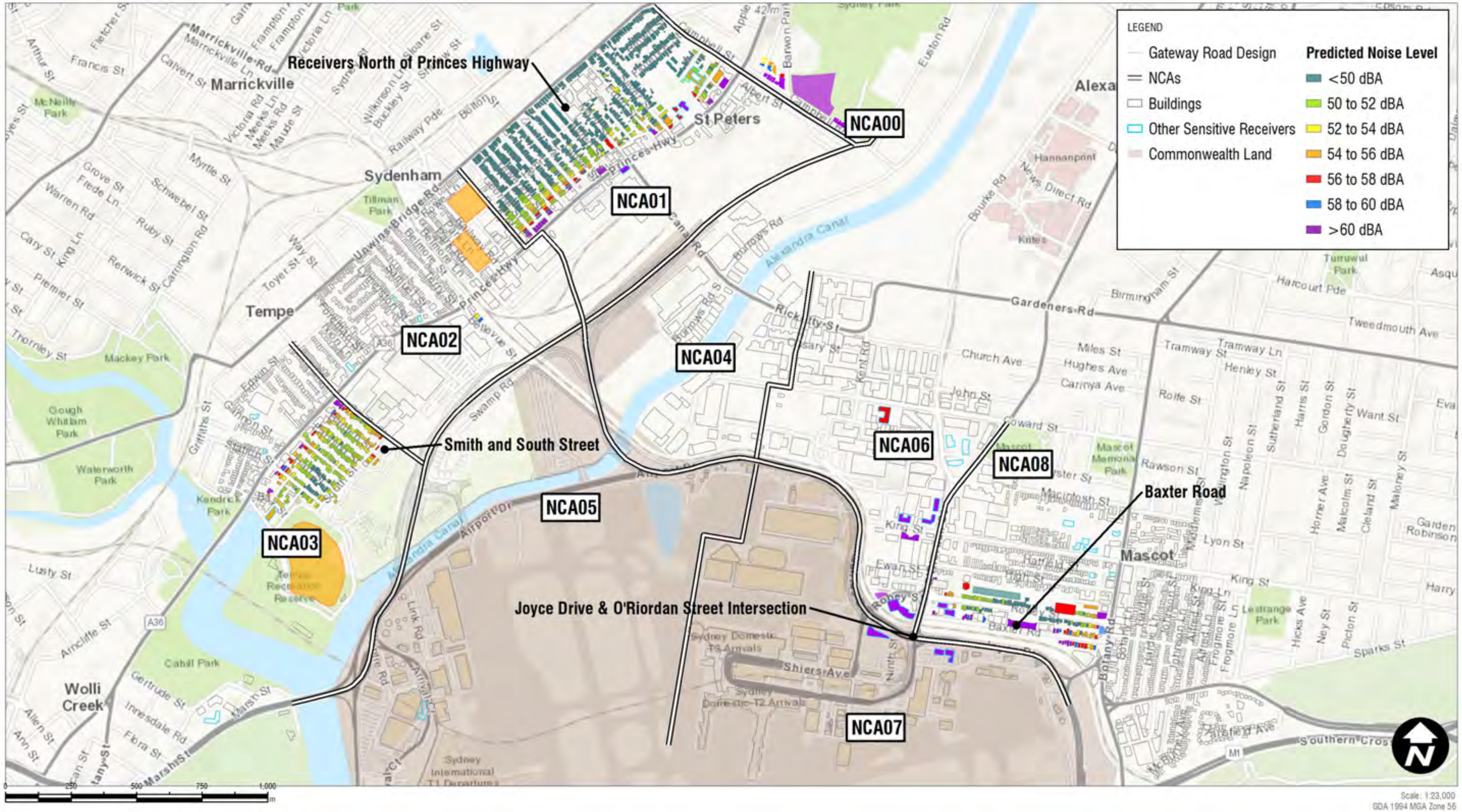
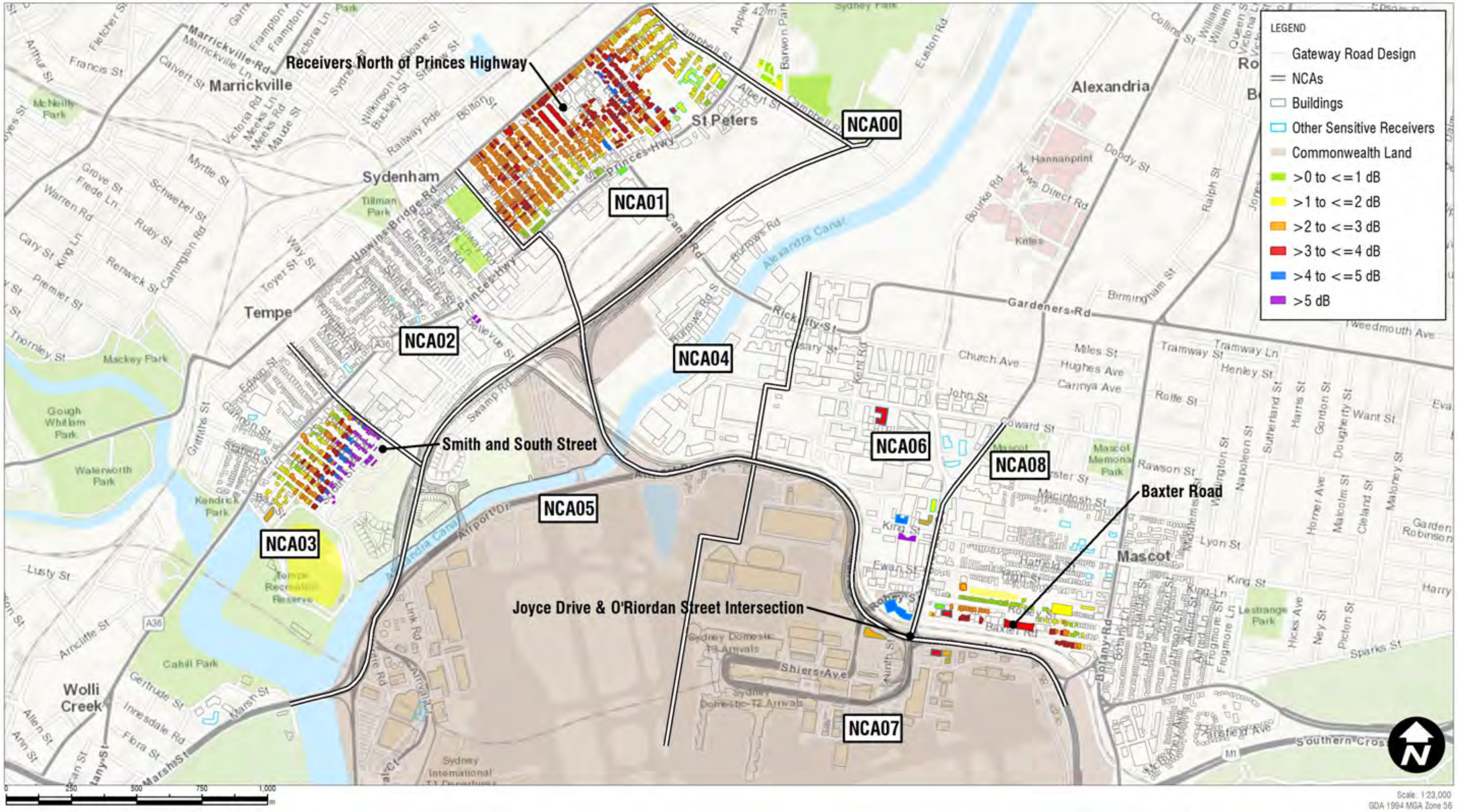


Figure 30 Worst-case Predicted Change in Operational Noise (2036 Night-time, Build minus No Build)



SLR

Figure 31 Predicted Operational Noise Level at Residential Receivers (2036 Night-time, Build)

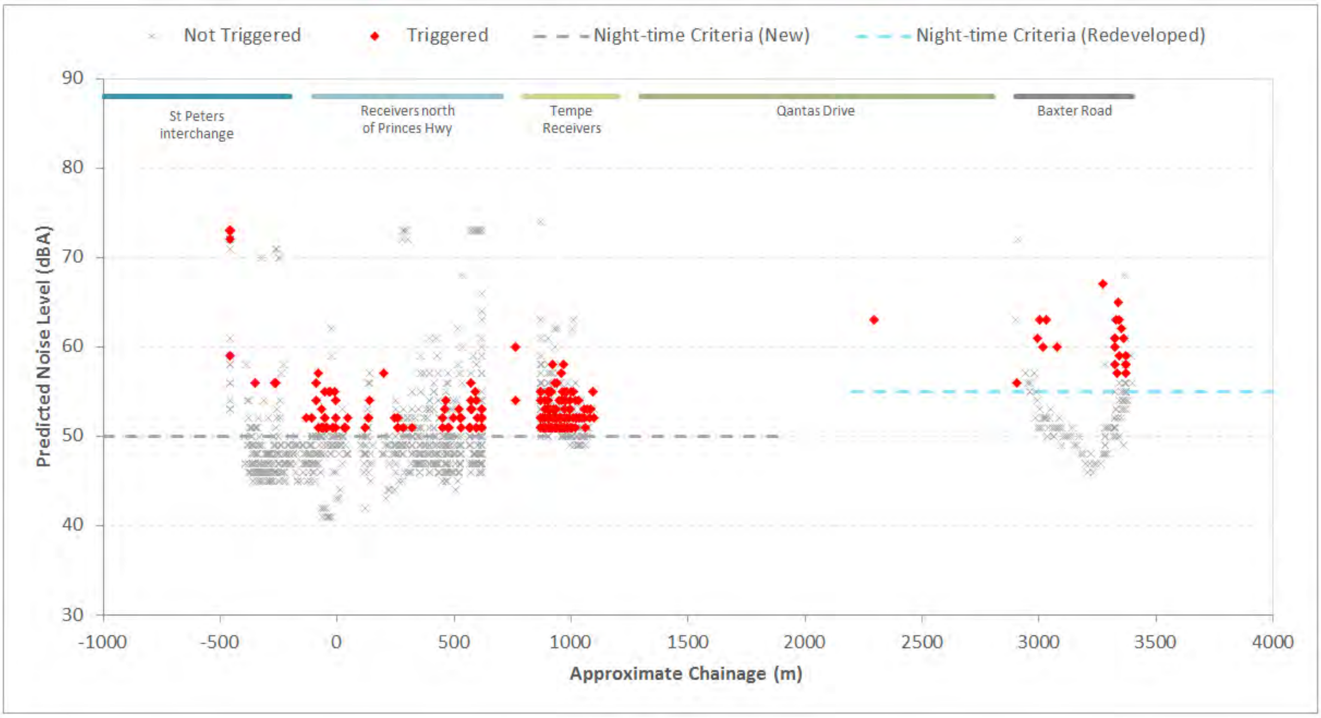
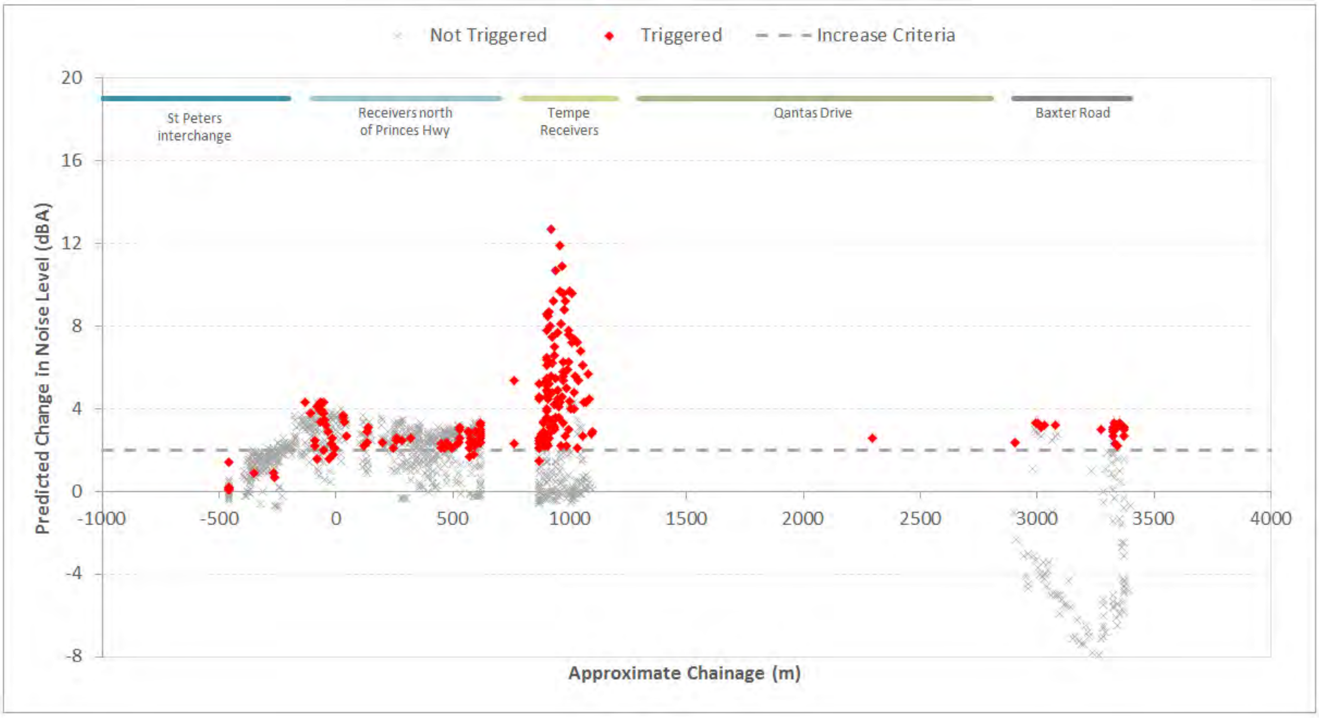


Figure 32 Predicted Change in Operational Noise Level at Residential Receivers (2036 Night-time, Build minus No Build)



Note 1: Chainage is shown in **Figure 8**.

Note 2: For a receiver to be triggered it must meet one of the three NMG triggers shown in **Section 4.4.9**.

The above results show the following:

- Many residential receivers in the study area are subject to relatively high existing road traffic noise impacts which already exceed the NCG criterion in many cases.
- The project would introduce new sources of road traffic noise to some areas , with substantial increases in road traffic noise levels (ie greater than 2.0 dB) being predicted in certain areas, including:
  - NCA01 – to the north of Princes Highway. This area is predicted to have increases of up to 5 dB. The largest increases are predicted towards the back of the catchment, away from Princes Highway, which is due to the ground increasing in elevation in this direction which results in line of sight to the new roads in the distance.
  - NCA03 – receivers in Tempe to the north Tempe Recreation Reserve. This area is predicted to have increases of up to 13 dB. Residential receivers on Smith Street and South Street which face the new alignment are the most affected due to existing road traffic noise levels in this area being relatively low. Receivers further away from the new alignment that are closer to Princes Highway are less affected as noise levels become dominated by existing roads.
- In other areas of the project, increases in noise due to widening works and increased traffic volumes are predicted, including:
  - NCA06 and NCA07 – receivers near the Joyce Drive and O'Riordan Street intersection. The areas to the west of O'Riordan Street and to the south of the intersection are predicted to have increases of up to 4 dB. This is due to the combined effect of increased traffic on Qantas Drive and the new viaduct to Sydney Airport Terminals 2/3.
  - NCA08 – on Baxter Road in Mascot. Residential receivers are predicted to have increases of up to 3 dB. This is due to traffic increases on Joyce Drive, in particular heavy vehicles. It is noted that this area is outside of the project site and there are no physical Sydney Gateway road project works in this area.
- Exceedances of the NCG cumulative limit criteria (ie 5 dB or more above the NCG controlling criterion) are predicted in most catchments that have residential receivers.
- The project is predicted to result in acute noise levels (ie daytime noise levels are 65 dBA or higher, or night-time noise levels are 60 dBA or higher) for residential receivers adjacent to Campbell Street in NCA00 and at one receiver in NCA06.
- In summary, the project results in:
  - 215 residential receivers having increases of greater than 2.0 dB
  - 34 residential receivers being above the cumulative limit criteria
  - Nine residential receivers having acute noise levels
  - In total there are 231 residential receivers that are predicted to have exceedances of the NCG operational road traffic noise criteria.

6.2.2 'Other Sensitive' Receivers

'Other sensitive' receivers that are predicted to have exceedances of the trigger levels are shown in **Table 45** for the controlling 2036 scenario. The location of the triggered 'other sensitive' receivers are shown **Figure 33**.

Table 45 'Other Sensitive' Receivers Triggers

NCA	Receiver	Type	NMG Triggers[1]		
			Trigger 1 >2.0 dB	Trigger 2 Cumulative	Trigger 3 Acute
NCA01	St Peters Public School	Educational	-	Y	-
		Educational	-	Y	-
	St Peters Anglican Church	Place of Worship	-	Y	-
		Place of Worship	Y	Y	-
		Place of Worship	-	Y	-
NCA03	Guardian Early Learning Centre	Childcare	Y	Y	-
NCA06	Aero Kids Early Learning Centre	Childcare	Y	Y	-
	Stamford Plaza Sydney Airport	Hotel	Y	Y	Y
	Travelodge	Hotel	Y	Y	Y
	Coleman Reserve	Outdoor Passive	-	Y	Y
NCA07	Ibis Budget Sydney Airport	Hotel	Y	-	Y
	Mantra Hotel	Hotel	Y	-	Y
	Future airport hotel	Hotel	Y	Y	Y
NCA08	Quest Mascot (Hotel)	Hotel	-	-	Y
	Citadines Connect Sydney Airport	Hotel	Y	-	Y

Note 1: The NMG triggers are discussed in **Section 4.4.9**.

In summary, the above assessment shows a total of 15 'other sensitive' receiver buildings are predicted to have exceedances of the NCG operational road traffic noise criteria.

It is noted that a number of hotels have been identified as exceeding the NCG criteria. These receivers have been assessed as residential on the basis that they may have staff who reside permanently on site. Further investigation of the impacts at hotels should be completed during Detailed Design, noting that only areas of permanent residence require assessment and consideration of mitigation.

6.2.3 Receivers Eligible for Consideration of 'Additional Noise Mitigation'

The receivers which have been identified as eligible for consideration of 'additional noise mitigation' (ie triggered receivers) are summarised in **Table 46** and shown in **Figure 33**.

Table 46 Receivers Eligible for Consideration for 'Additional Noise Mitigation'

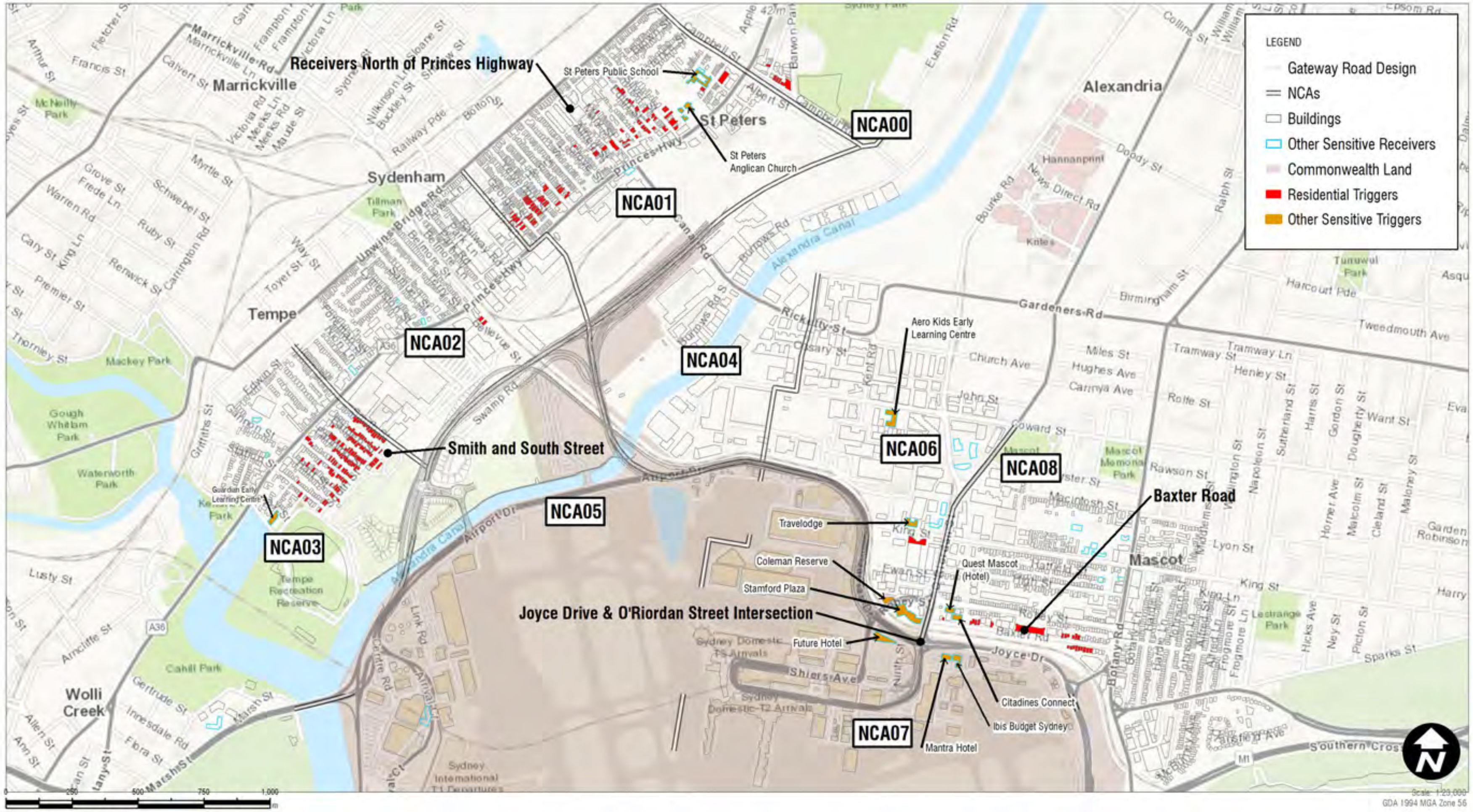
NCA	Number of Triggered Buildings (Floors)		Comments
	Residential	Other Sensitive	
NCA00	9 (18)	- (-)	Residential receivers are triggered to the north of St Peters interchange, on Campbell Street, due to acute noise levels from the project. It is, however, noted that noise levels in this area are dominated by non-project roads (ie from Campbell Street and St Peters interchange), with non-project noise levels being around 10 dB higher than noise levels from Sydney Gateway road project alone. The Campbell Street receivers are also identified in the WestConnex New M5 EIS as being eligible for treatment from that project. With consideration of this, it is unlikely that further treatment of these receivers would be required.
NCA01	78 (83)	5 (9)	Residential receivers are triggered to the north of Princes Highway due to an increase in noise levels from the new project roads in the distance. Triggered 'other sensitive' receivers include St Peters Public School and Church.
NCA02	2 (2)	- (-)	Two isolated receivers are triggered near Ikea due to increases in noise.
NCA03	119 (131)	1 (1)	This catchment is to the north of Tempe Recreation Reserve and residential receivers here are close to new project roads. Large increases in noise are predicted for facades of receivers which face the project, which results in these receivers being triggered. The triggered 'other sensitive' receiver is Guardian Early Learning Centre.
NCA04	- (-)	- (-)	No triggered receivers identified.
NCA05	- (-)	- (-)	No triggered receivers identified.
NCA06	1 (10)	4 (33)	One residential apartment block on King Street is triggered in this catchment. Triggered 'other sensitive' receivers include Aero Kids Early Learning Centre, Travelodge[2], Coleman Reserve and Stamford Plaza hotel[2].
NCA07	- (-)	3 (25)	Triggered 'other sensitive' receivers include Ibis Budget Sydney[2], Mantra Hotel[2] and the future airport hotel[2].
NCA08	22 (34)	2 (13)	Residential receivers on Baxter Road are triggered due to increases in traffic volumes on Joyce Drive. Triggered 'other sensitive' receivers include Citadines Connect Sydney Airport[2] and Quest Mascot[2].
Sub Total	**231 (278)**	**15 (81)**	-
TOTAL	**246 (359)**		

Note 1: The count of 'floors' represents separate floors within each building. For some receivers there would likely be multiple units within the same floor, such as in residential apartment blocks.

Note 2: Where hotels are triggered, only areas of permanent residence are eligible for consideration of additional mitigation.

In summary, the above assessment shows a total of 246 sensitive receiver buildings (359 individual floors) are predicted to have exceedances of the NCG operational road traffic noise criteria and are therefore eligible for consideration of 'additional noise mitigation'. Operational noise mitigation measures for the project are discussed further in **Section 8.2**.

Figure 33 Receivers Eligible for Consideration of Additional Mitigation



Note: Where hotels are shown as triggered, only areas of permanent residence are eligible for consideration of additional mitigation. This should be confirmed during detailed design.

6.2.4 Maximum Road Traffic Noise Levels

Existing Maximum Noise Levels

Existing maximum noise levels were measured in the study area during the noise monitoring survey and a summary of the data is shown in **Table 47**. Detailed results are provided in **Appendix E**.

Table 47 Existing Maximum Noise Level Events

Monitoring Location	Monitoring Period	Total Night-time Events	Measured Maximum Noise Levels (dBA L_{Amax})	
			Range	Average
L01 – Princes Hwy	18 – 30 October 2018	174	81-96	87
L04 – Tempe	18 – 30 October 2018	109	66-85	79
L06 – Qantas Drive	18 – 30 October 2018	294	70-103	84

The above table shows that existing maximum noise level events are a regular feature at the monitoring locations and typically range from 70 to 90 dBA. Higher levels were measured at L01 and L06 due to their proximity to adjacent roads.

Maximum noise level events towards the upper end of the range are likely to be from heavy vehicle passbys, with light vehicles tending to be in the lower end of the range. Aircraft flyovers would also have affected the number of maximum noise level events at L06.

Future Maximum Noise Levels

As the project would introduce a number of new roads there is potential for changes to maximum noise level events in the study area. A summary of the predicted changes is provided in **Table 48**.

Table 48 Predicted Change in Maximum Noise Levels

NCA	Worst-case Change (dB)	Discussion
NCA00	0	Negligible change in maximum noise levels is predicted from the project at receivers in this NCA due to their proximity to non-project roads such as Campbell Street.
NCA01	3	Maximum noise levels are predicted to increase by up to 3 dB. This is generally due to the project affecting the southern facades of buildings that are currently screened from existing roads such as Princes Highway.
NCA02	9	Maximum noise levels are predicted to increase by up to 9 dB. This is generally due to the project affecting the southern facades of buildings that are currently screened from existing roads.
NCA03	17	Maximum noise levels are predicted to increase by up to 17 dB. The most affected receivers are those situated on South Street in Tempe, due to the proximity of new project roads to the south of this area. The increase in maximum noise levels is less for receivers nearer Princes Highway.
NCA04	-	No residential receivers in this NCA.
NCA05	-	No residential receivers in this NCA.
NCA06	5	Maximum noise levels are predicted to increase by up to 5 dB. The highest increase is predicted at the southern facades of the Stamford Plaza hotel, which is directly adjacent the new viaduct. Negligible change in maximum noise levels is predicted at other receivers in this NCA.
NCA07	0	Negligible change in maximum noise levels is predicted at receivers in this NCA.
NCA08	0	Negligible change in maximum noise levels is predicted at receivers in this NCA.

Where large increases in maximum noise levels are predicted the affected receivers are likely to also be above the NCG criteria and therefore likely to have been identified as being eligible for consideration of ‘additional noise mitigation’ (see **Section 6.2.2**). Mitigation measures used to control road traffic noise impacts would potentially also reduce the potential maximum noise level impacts.

While receivers are not triggered for consideration of ‘additional noise mitigation’ by maximum noise levels alone, selection of feasible and reasonable mitigation measures during the detailed design stage should consider the change in maximum noise levels and the effect the potential mitigation would have on those levels.

It is noted that a signalised intersection would be introduced as part of the Terminal 1 connection (see **Figure 1**) which may affect receivers in NCA03. The final approach to mitigating operational road traffic noise impacts in this area should take into account the potential effect the intersection would have on maximum noise levels, including stop-start traffic and pedestrian crossing beepers.

6.3 Airport Ground-based Noise

Sydney Gateway road project would potentially alter aircraft related ground-based operational noise impacts from Sydney Airport due to the removal of several airport buildings and the removal of shipping containers near Tempe Reserve.

Ground-based noise impacts from activities at Sydney Airport have been predicted to the surrounding receivers. The potential changes to impacts are expected to be limited to receivers near Tempe Reserve in NCA03 and near O'Riordan Street in NCA06/NCA08 (see **Figure 9**).

A summary of the potential changes to ground-based noise impacts at residential and 'other sensitive' receivers is shown in **Table 49**. Grid noise maps showing the potential increase in noise levels at ground floor are shown in **Figure 34** to **Figure 39** for each of the six assessed scenarios.

Table 49 Predicted Worst-case Ground-based Noise Levels and Increase from Existing

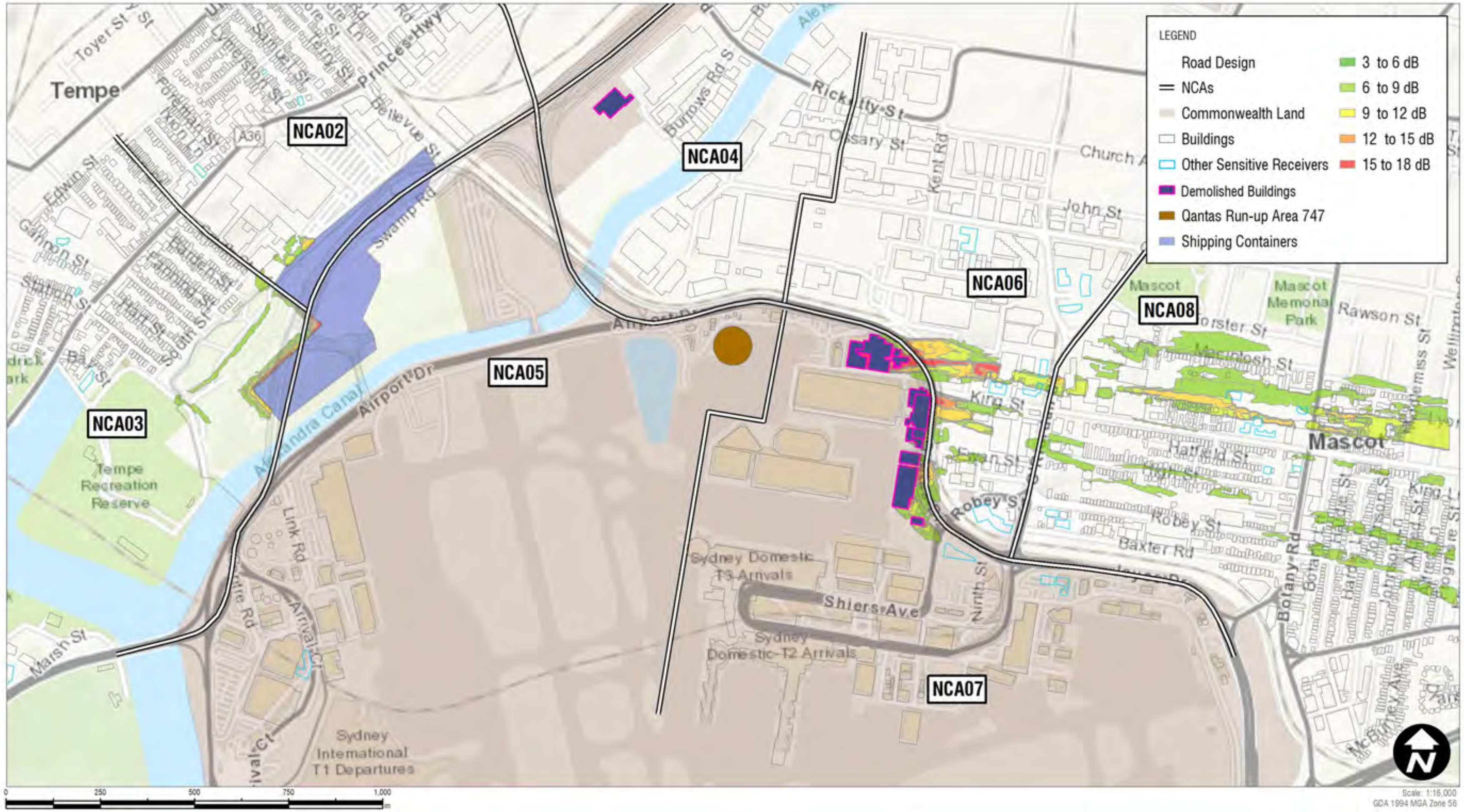
Scenario	NCA	Receiver Type	Receiver Address	Criteria[1]	Worst-case Predicted (dBA)		Most Affected Floors
					Noise Level[3]	Increase	
1 – Qantas run up area 747[2]	NCA03	Residential	South Street	52/50/48	69	1	Ground
	NCA06 /NCA08	Residential	King Apartments	70/68/63	81	11	Third
		Hotel	Travelodge	73/63/58	81	16	Second to ninth
2 – Qantas run up area Dash 8[2]	NCA03	Residential	South Street	52/50/48	63	1	Ground
	NCA06 /NCA08	Residential	King Apartments	70/68/63	70	9	Ground to first
		Hotel	Travelodge	73/63/58	70	9	Ground to first
3 – Northern pond apron	NCA03	Residential	South Street	47/45/43	50	1	Ground
	NCA06 /NCA08	Residential	King Apartments	65/63/58	50	5	Fifth to sixth
		Hotel	Travelodge	68/58/53	54	2	Ground to twelfth
4 – Western freight area	NCA03	Residential	South Street	47/45/43	50	3	Ground
	NCA06 /NCA08	Residential	King Apartments	65/63/58	45	-	-
		Hotel	Travelodge	68/58/53	49	4	First to ninth
5 – Qantas eastern area	NCA03	Residential	South Street	47/45/43	30	1	Ground
	NCA06 /NCA08	Residential	King Apartments	65/63/58	64	5	Seventh to ninth
		Hotel	Travelodge	68/58/53	59	10	Ground to first
6 – Dash 8 gates	NCA03	Residential	South Street	47/45/43	48	1	Ground
	NCA06 /NCA08	Residential	King Apartments	65/63/58	50	9	First to third
		Hotel	Travelodge	68/58/53	52	9	Ground to first

Note 1: The criteria are daytime/evening/night-time, see **Table 22**.

Note 2: Engine run up scenario. The criteria are 5 dB higher to due to this activity occurring infrequently, see **Table 22**.

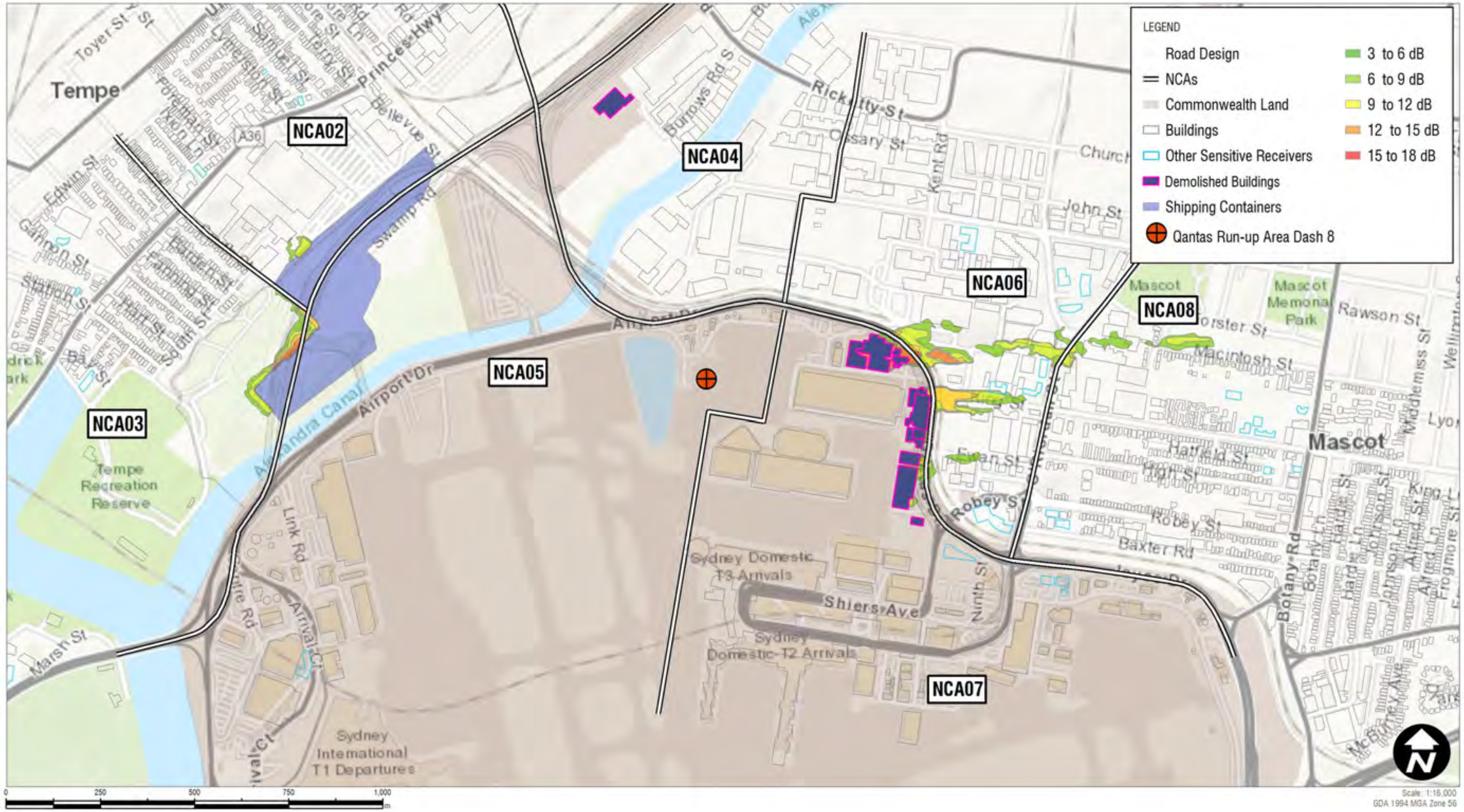
Note 3: The worst-case predicted noise levels are based on the facade and floor of each building with the greatest increase.

Figure 34 Scenario 1, Qantas Run Up Area 747 – Predicted Increase in Noise Levels



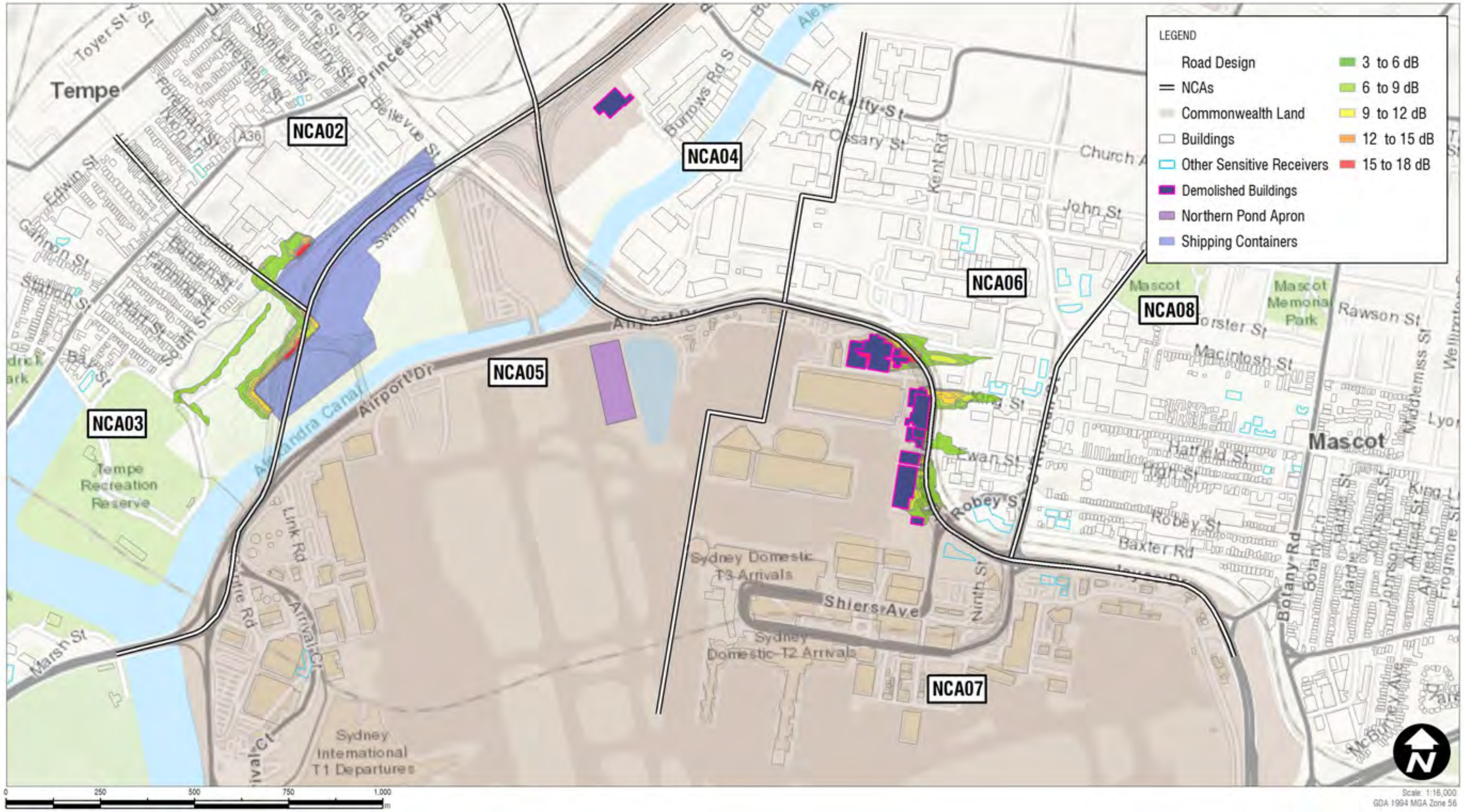
Note 1: Impacts are shown where increase of ≥3 dB are predicted, as changes in noise of 1 to 2 dB are generally accepted as not being perceptible by most people

Figure 35 Scenario 2, Qantas Run Up Area Dash 8 – Predicted Increase in Noise Levels



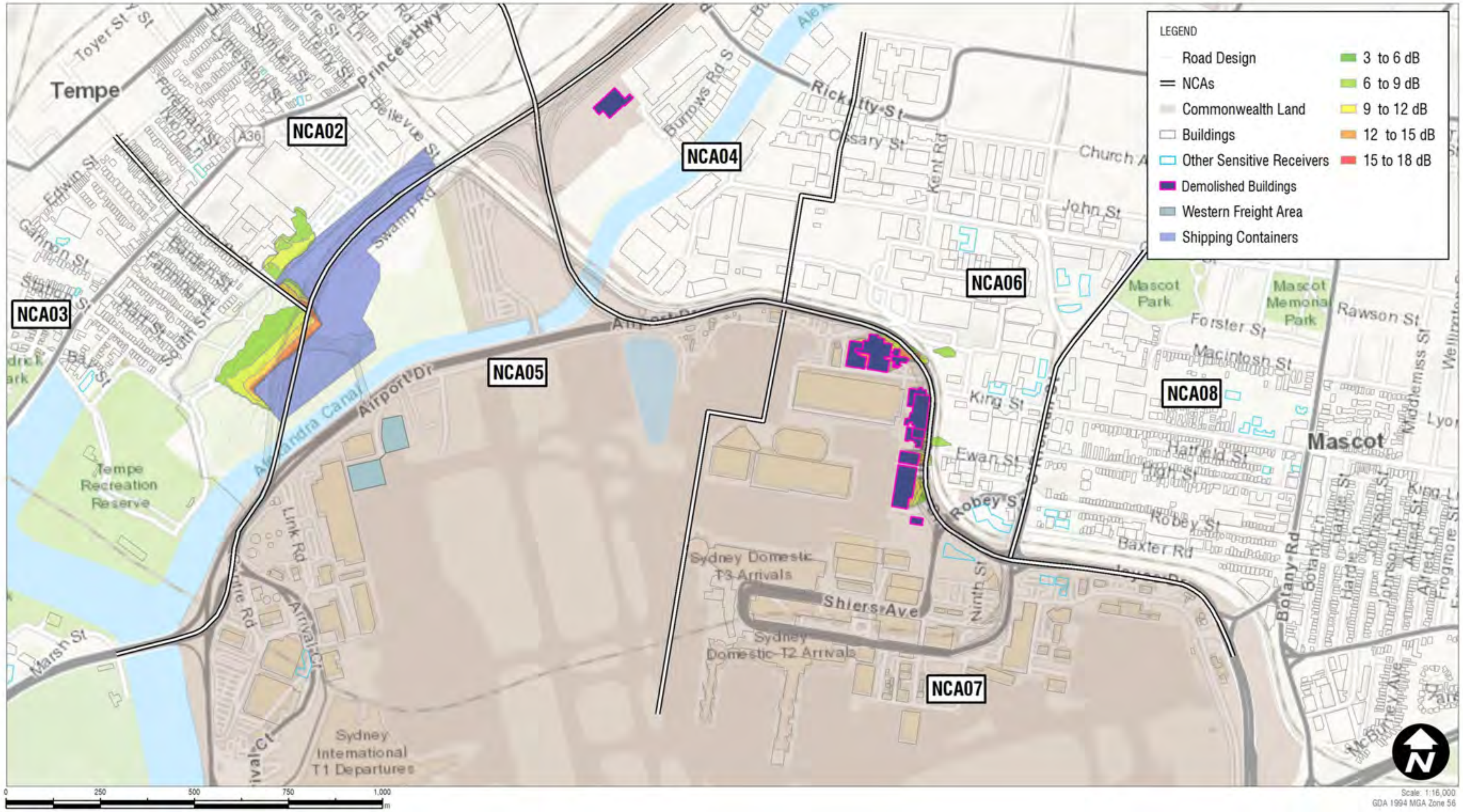
Note 1: Impacts are shown where increase of ≥3 dB are predicted, as changes in noise of 1 to 2 dB are generally accepted as not being perceptible by most people

Figure 36 Scenario 3, Northern Pond Apron – Predicted Increase in Noise Levels



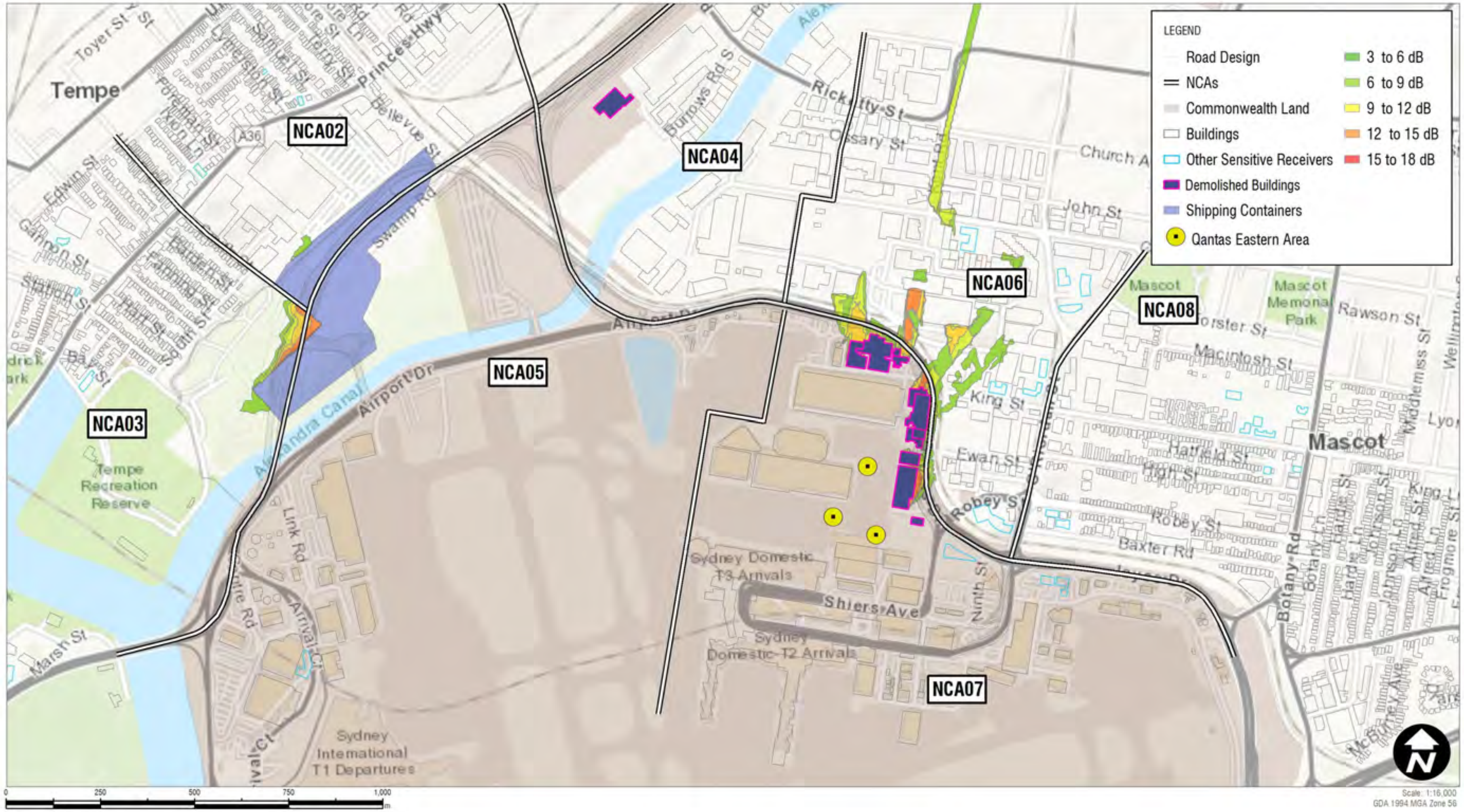
Note 1: Impacts are shown where increase of ≥3 dB are predicted, as changes in noise of 1 to 2 dB are generally accepted as not being perceptible by most people

Figure 37 Scenario 4, Western Freight Area – Predicted Increase in Noise Levels



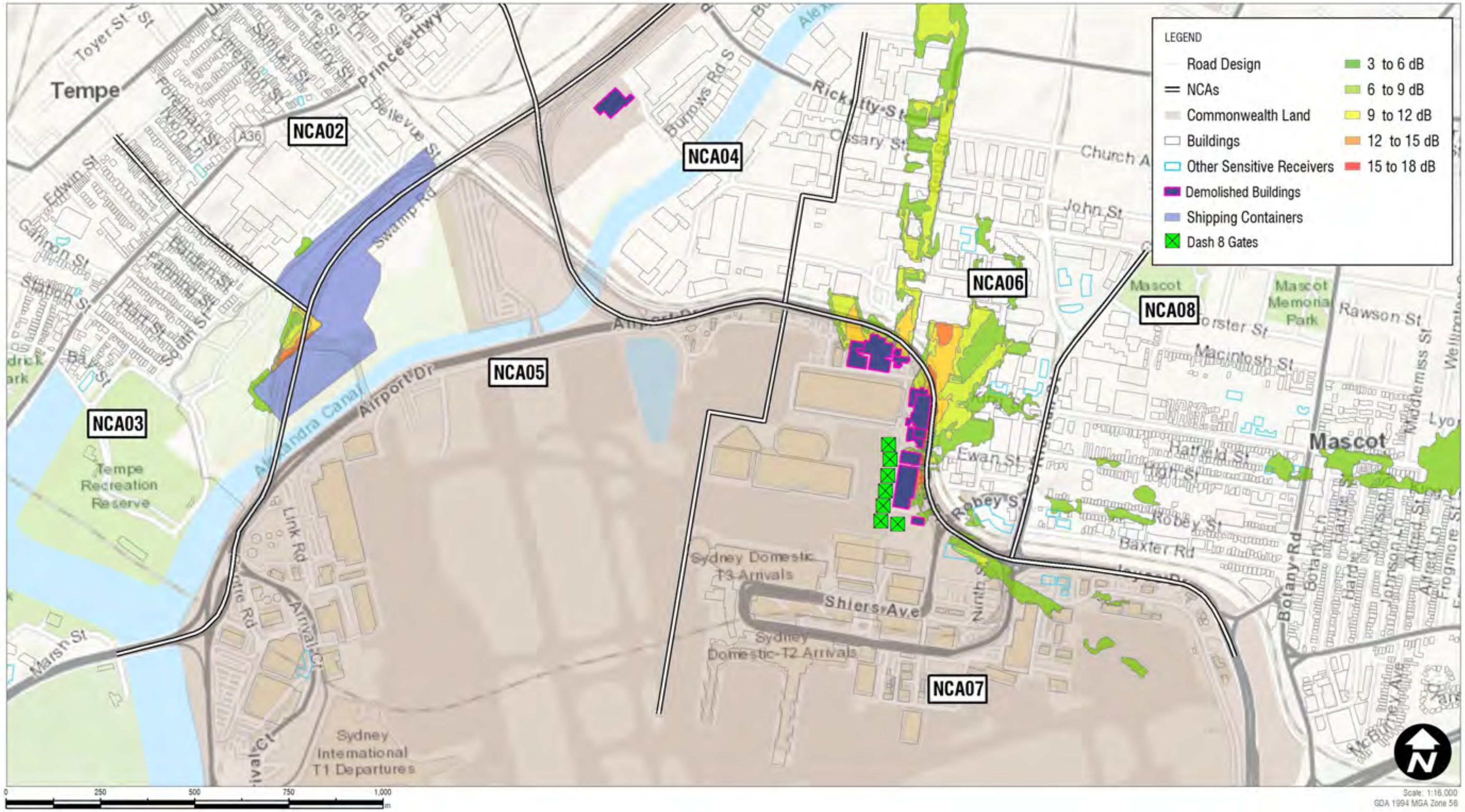
Note 1: Impacts are shown where increase of ≥3 dB are predicted, as changes in noise of 1 to 2 dB are generally accepted as not being perceptible by most people

Figure 38 Scenario 5, Qantas Eastern Area – Predicted Increase in Noise Levels



Note 1: Impacts are shown where increase of ≥3 dB are predicted, as changes in noise of 1 to 2 dB are generally accepted as not being perceptible by most people

Figure 39 Scenario 6, Dash 8 Gates – Predicted Increase in Noise Levels



Note 1: Impacts are shown where increase of ≥3 dB are predicted, as changes in noise of 1 to 2 dB are generally accepted as not being perceptible by most people

The above assessment shows the following:

- The removal of the shipping containers at Tyne Containers is predicted to result in increases in aircraft related ground-based noise levels at residential receivers in NCA03 by up to 3 dB for *Scenario 4 – Western Freight Area*. The other scenarios, which are further to the east, are predicted to result in increases of 1 dB.
- The removal of buildings adjacent to Qantas Drive is predicted to result in worst-case increases of up to 16 dB at the Travelodge hotel in NCA06 for *Scenario 1 – Qantas Run-up Area 747*. Increases of up to 11 dB are predicted at King Apartments for the same scenario. The other scenarios are predicted to have lower impacts, with increases of between 0 and 9 dB.
- Larger increases in noise are generally predicted at the lower or middle floors of the affected multi-storey buildings. Upper floors are less impacted because these locations already have line of sight to the operational areas of the airport, over the buildings that are proposed to be removed.
- The noise levels from aircraft related ground-based activities at the nearest receivers are predicted to be above the criteria during high noise generating activities such as aircraft engine running (ie *Scenario 1 – Qantas Run-up Area 747* and *Scenario 2 – Qantas run up area Dash 8*), particularly during the evening or night-time. The predicted noise levels during use of APUs and aircraft taxiing are lower, however, exceedances at the nearest receivers are also predicted at times during these activities.
- It is noted that aircraft ground-based noise is already a feature of the site and existing noise levels from these activities likely already exceed the criteria at certain times.

While the project is predicted to result in relatively large increases in noise during engine ground running from the removal of buildings, this activity would likely occur infrequently, especially during the night-time, and high power running would not occur every night. Furthermore, when engine ground running occurs it typically only lasts for a short period. Reference to the existing noise monitoring data shows noise levels near Qantas Drive are already high. Noise levels of 70 to 75 dBA $L_{Aeq(15minute)}$ occur frequently, with occasional levels of around 80 dBA.

Mitigation measures for ground-based activities are discussed in **Section 8.3**.

Airport Curfew

During certain runway maintenance works, aircraft operating during curfew hours would on occasion be required to operate at the very northern end of the north-south runway. Impacts resulting from this at receivers in NCA03 could therefore be altered by the project due to the removal of the shipping containers at Tyne Containers.

The potential changes in noise level at these receivers would be expected to be similar to those predicted for Scenario 3 and 4 of the ground-based aircraft noise assessment (see **Table 34**) which predicts increases in noise of between 1 to 3 dB from the removal of the containers. It is noted, however, that the need for aircraft to operate in this area during curfew hours is expected to be infrequent.

6.4 Summary of Operational Impacts on Commonwealth Land

6.4.1 Operational Road Traffic Noise

The potential operational impacts on Commonwealth land would generally be limited to NCA05 and NCA07. These areas are mostly commercial use, however, there are three existing hotels (Rydges Sydney Airport in NCA05 and Mantra Hotel and Ibis Budget Sydney Airport in NCA07) and a future hotel located near the intersection of Qantas Drive and O'Riordan Street. The Qantas Flight Training Centre is also on Commonwealth land, located to the south of Qantas Drive in NCA07.

Hotels

The potential operational impacts on the hotels on Commonwealth land are assessed in **Section 6.2**. The assessment predicted increases in road traffic noise levels at the Mantra Hotel, Ibis Budget Sydney Airport and the future hotel in NCA07 of around 4 dB which is due to the combined effect of increased traffic on Qantas Road and the new viaduct to Sydney Airport Terminals 2/3.

Qantas Flight Training Centre

The Qantas Flight Training Centre is located next to Qantas Drive. The centre provides flight training for pilots and cabin crew and operates 24 hours a day, seven days a week. The centre has several specialist flight simulators that are required to be kept operational to meet training needs.

Criteria for educational receivers are provided in AS2107 *'Acoustics – Recommended design sound levels and reverberation times for building interiors'*, with internal L_{Aeq} noise levels of around 35 to 45 dB being recommended for audio visual areas. When a 20 dB difference between external and internal noise levels is assumed for closed windows, this equates to an external noise level of 55 to 65 dB at the facade of the building.

Existing L_{Aeq} road traffic noise levels were measured close to Qantas Flight Training Centre (at location L06) as being 72 dB during the daytime and 70 dB at night, indicating that the internal criteria might already be exceeded.

Road traffic noise levels at the Qantas Flight Training Centre are predicted to increase by around 3 dB as a result of the project, which is due to Qantas Drive being widened and having increased traffic volumes.

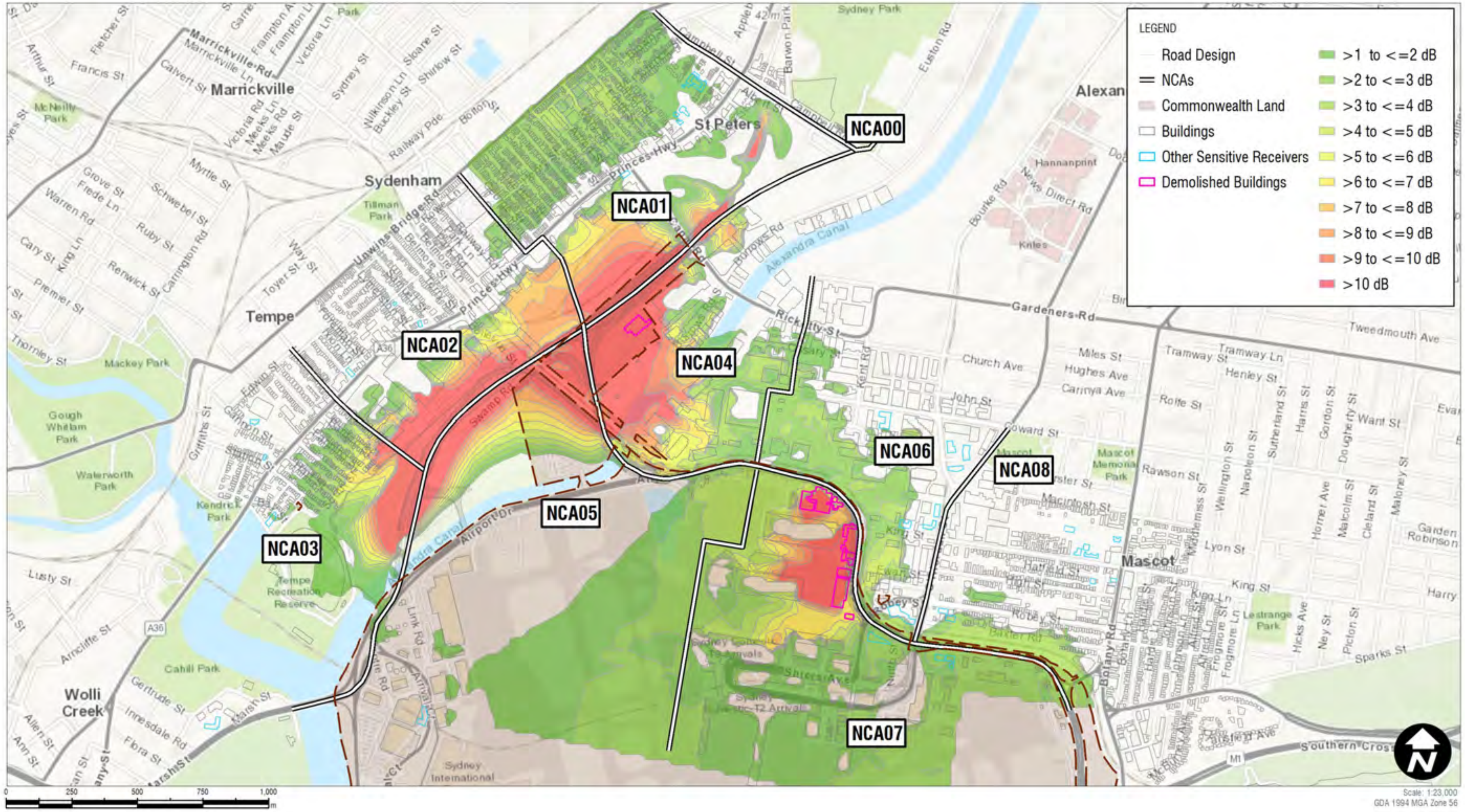
Impacts on Other Areas of Commonwealth Land

Receivers in the other areas of Commonwealth Land are commercial which the NCG does not consider to be sensitive to operational road traffic noise impacts. Criteria for commercial receivers are provided in AS2107.

The commercial buildings on Commonwealth land would have a variety of uses. AS2017 recommends internal L_{Aeq} noise levels of around 40 to 45 dB for general office buildings. When assuming a 10 dB difference between external and internal noise levels for open windows, this equates to an external noise level of 50 to 55 dB at the facade of the affected buildings.

The potential impacts on the commercial uses of Commonwealth land have been assessed by predicting the change in road traffic noise level that would result from the project. The change in noise level for the controlling 2036 future design night-time scenario is shown in **Figure 40**.

Figure 40 Change in Noise Level Across the Project – Commonwealth Land



Note: Predicted noise levels are for 2036 night-time scenario at ground floor level.

The above figure indicates the following:

- The project is predicted to increase road traffic noise levels on Commonwealth land in most areas due to altered road layouts, widened roads and increased traffic volumes.
- The noise level increases to the south of Qantas Drive at Terminals 2/3 are typically around 1 to 4 dB depending on location. Increases of greater than 10 dB are, however, predicted for areas immediately to the west of the removed buildings next to Qantas Drive. This is due to the removed buildings allowing these areas to have a new line of sight to the widened Qantas Drive and Terminal 2/3 viaduct, whereas previously they were screened from view. It is noted, however, that much of this area is restricted to the public and also already subject to high levels of aircraft noise.
- Commercial buildings on Commonwealth land that are adjacent to the widened section of Qantas Drive and have line of sight to the nearest project roads are predicted to exceed the 50 to 55 dB external criteria. Existing noise levels in areas next to Qantas Drive are already high, with levels around 70 dB being measured during the daytime and night-time (see **Section 2.2**).
- The noise levels on Commonwealth land to the north of Alexandra Canal, near the north precinct carpark, are also predicted to increase substantially. This increase varies depending on the proximity to the Sydney Gateway road project alignment. However, no receivers are present in this area.

Significance of Impacts

The EPBC act requires projects on Commonwealth land to determine if the outcomes of the project are likely to have a significant impact on the environment. The process outlined in the EPBC act Significant impact guidelines 1.2 has been followed to determine if the operation of the Sydney Gateway road project on Commonwealth land would likely have a significant impact.

Many of the receivers on Commonwealth land are commercial use with relatively low sensitivity. While certain sensitive receivers near the Joyce Drive and O'Riordan Street intersection are likely to have increases in operational road traffic noise of greater than 2 dB and/or high increases in ground-based aircraft related operational noise, the number of affected receivers is relatively small. The impacts would be reduced as far as practicable through the use of all available feasible and reasonable mitigation measures, including consideration of a noise barrier for offsite impacts near Baxter Road and architectural treatment of residual impacts at eligible receivers. Overall, for a major infrastructure project in an urban area the impacts are not considered significant.

6.5 Consistency with the Sydney Airport Master Plan 2039 and Environment Strategy 2019-2024

The Sydney Airport Master Plan 2039 (Section 14.6.4 – Ground-based Noise) and the Environmental Strategy 2019-2024 (Section 3.5 – Ground-based Noise) notes that noise from developments at the airport are assessed at the development approval stage.

Both documents set out several strategies that will be used to manage and reduce ground-based noise from the airport, which includes road traffic. The following are considered relevant to the project:

- Continue to undertake regular monitoring of ground-based noise sources at the airport
- Continue to ensure that ground-based noise is assessed and managed for the construction and operational phases of development proposals

- Carry out ground-based operational noise modelling for major developments impacting airport operations, assess noise predictions against relevant criteria and develop appropriate noise management measures
- Continue to monitor ground-based noise complaints at the airport.

The assessment of operational noise from Sydney Gateway road project (see **Section 6.1.1** and **6.3**) and the recommendations for mitigating potential operational impacts from the project (see **Section 8.2**) are consistent with the above documents.

7 Cumulative Impacts

7.1 Construction Impacts

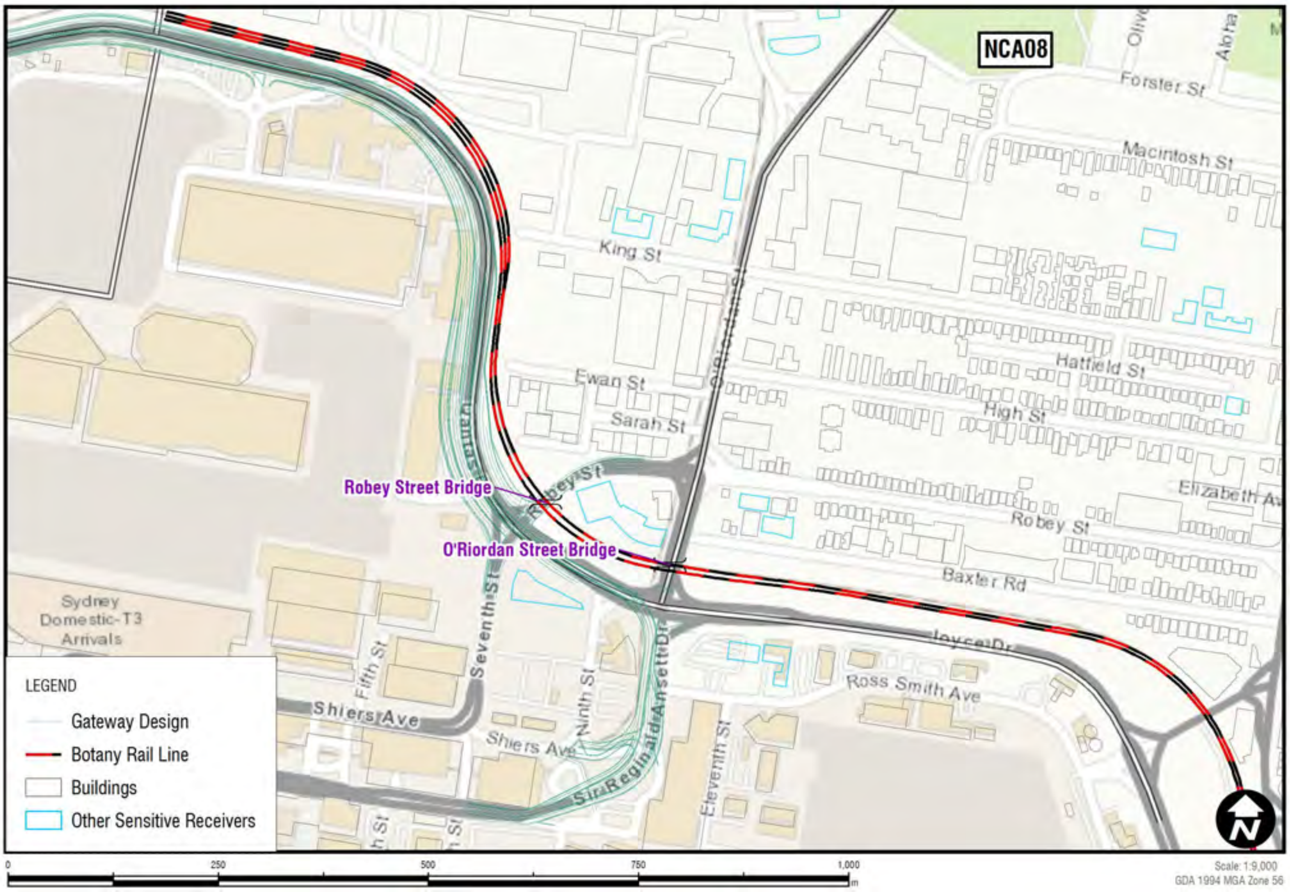
Cumulative construction noise impacts can occur where multiple works are being completed near to a particular receiver at the same time.

7.1.1 Botany Rail Duplication

The Botany Rail Duplication is an upgrade and duplication of the section of the Botany Rail Line between Mascot and Botany to increase rail freight capacity to Port Botany.

As the Botany Rail Duplication shares part of the same area as Sydney Gateway road project (ie NCA06, NCA07 and NCA08) is it likely that cumulative impacts from construction on both projects would occur at certain times. The location of the Botany Rail Duplication in relation to Sydney Gateway road project is shown in **Figure 41**.

Figure 41 Botany Rail Duplication and Sydney Gateway road project



An Environmental Impact Statement is currently being prepared for the Botany Rail Duplication which will assess the potential construction and operational impacts of the project.

7.1.1.1 Cumulative Construction Impacts

The indicative construction schedules for both projects are provided in **Table 50** and show that both projects would be constructed during similar timeframes.

Table 50 Indicative Construction Schedule for Long Duration Works

Project and Work Phase	2019				2020				2021				2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Sydney Gateway road project																								
Botany Rail Duplication																								

The potential construction noise impacts from the Botany Rail Duplication are currently being assessed and are therefore not available. However, since the construction scenarios for both projects would generally require similar items of equipment in similar locations, concurrent construction works could theoretically increase the worst-case noise levels in this report by around 3 dB.

The likelihood of worst-case noise levels being generated by two different works at the same time is, however, considered low and rather than increase construction noise levels, the impact of concurrent works on both projects would generally be expected to be an increase in the duration of noise impacts at the nearest receivers.

In practice, construction noise levels in any one location would vary and would be frequently much lower than worst-case due to construction phasing moving works around and in many cases only a few items of equipment being used at any one time.

Some of the Botany Rail Duplication works would also be completed during rail possessions where trains are stopped so that work can be completely safely. These possession periods would occur on four weekends each calendar year, with the shutdowns starting at about 2 am on Saturday and ending at 2 am on Monday. The use of possessions would further limit the likelihood of cumulative impacts occurring.

The potential impacts from cumulative works from the Sydney Gateway road project and Botany Rail Duplication works are most likely to occur where the projects overlap along Qantas Drive and Joyce Drive, in the region of NCA06, NCA07 and NCA08. Receivers in this area are generally commercial, however, a number of hotels are located near the intersection of Joyce Drive and O'Riordan Street along with residential receivers further to the east on Baxter Road.

Where works on both projects are occurring in similar areas there is potential for increased impacts at nearby affected receivers, particularly where works outside of Standard Construction Hours are required. It is important that coordination occurs between the two projects regarding evening and night-time works to ensure that appropriate respite is provided to affected receivers of both projects in accordance with the CNVG and/or the project's conditions of approval.

7.1.2 Other Proposed Major Developments

A number of other major projects are currently under construction or planned for construction near Sydney Gateway road project.

Construction works associated with road upgrades around Sydney Airport have been occurring in the area since 2016. The projects include:

- **Airport West Precinct** – in the vicinity of Marsh Street, Arncliffe. Works are complete.
- **Airport East Precinct** – covering Wentworth Avenue, Botany Road, Mill Pond Road, Joyce Drive and General Holmes Drive, Mascot. Construction began in 2016 and is scheduled to be complete in 2019.
- **Airport North Precinct** – in the vicinity of O'Riordan Street, Mascot. Early works started in July 2018 and main works are likely to be finished in 2020.
- **WestConnex, New M5 –** at St Peters interchange in the old Alexandria landfill site and Kogarah Golf Course. Construction commenced in late 2016 and is due for completion in 2020.
- **WestConnex, M4–M5 Link** – at St Peters interchange and Campbell Road. Construction is expected to be complete in early 2023.
- **Sydney Airport T2/T3 Ground Access Solutions and Hotel Project** – at the entrance to Terminal 2/3 of Sydney Airport. Works are likely to be completed between 2019 and 2021.
- **Boral Concrete St Peters** – Boral is proposing to upgrade its existing site on Burrows Road South. Works are proposed in 2020 and 2021.
- **Qantas Flight Training Centre relocation** – Qantas is proposing to relocate its existing centre. The proposed location is on King Street in Mascot, which is around 150 metres to the east of the existing centre. Construction of the new centre is proposed to start in the third quarter 2019 and last for 23 months.

Cumulative construction noise impacts may occur if construction on these projects is carried out at the same time as Sydney Gateway road project. There is also potential for consecutive impacts if certain receivers are affected by extended impacts from more than one project occurring after each other. Indicative construction schedules for these projects are provided in **Table 51**.

The project areas of these other major projects in relation to Sydney Gateway road project are shown in **Figure 42**.

Table 51 Indicative Construction Schedule for Major Projects

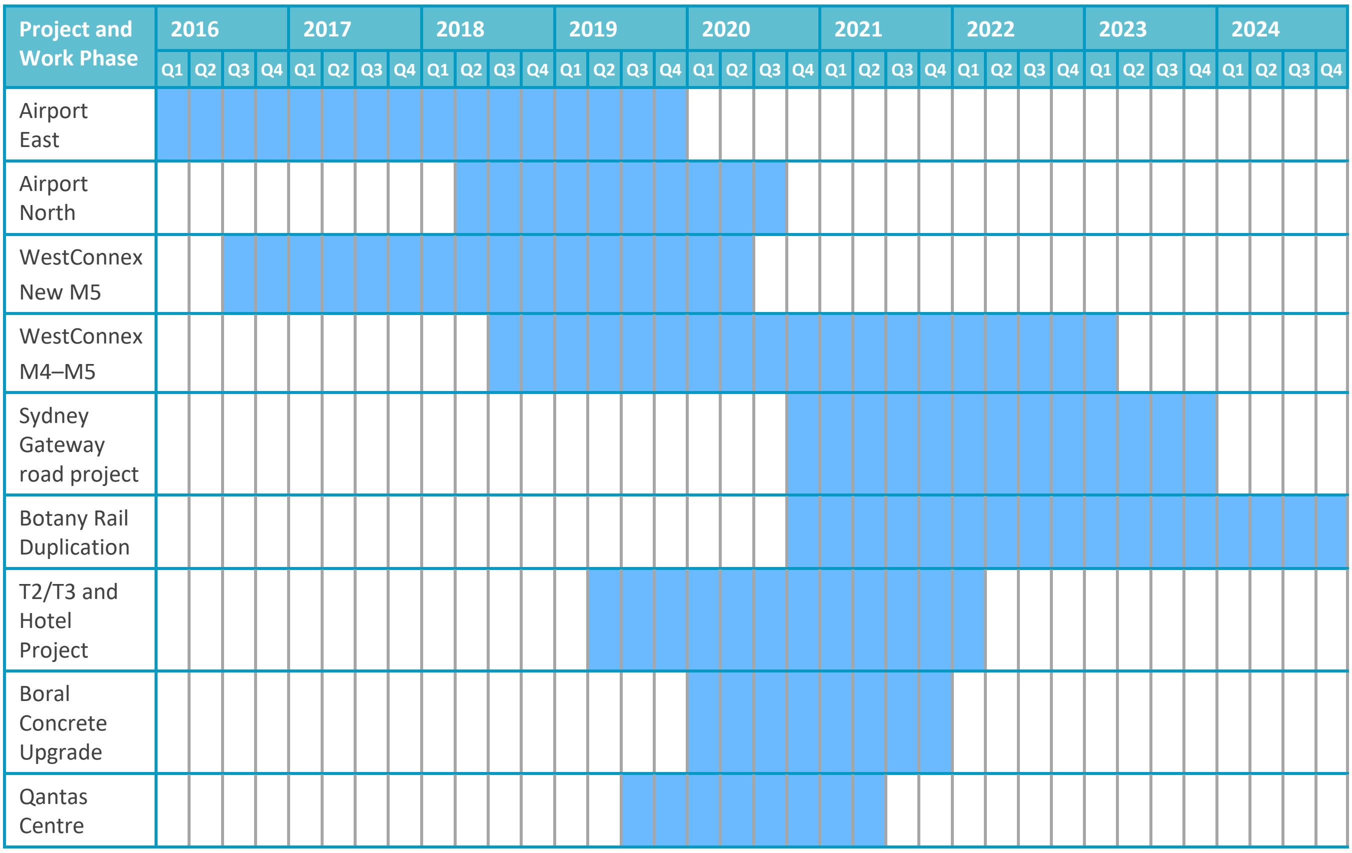
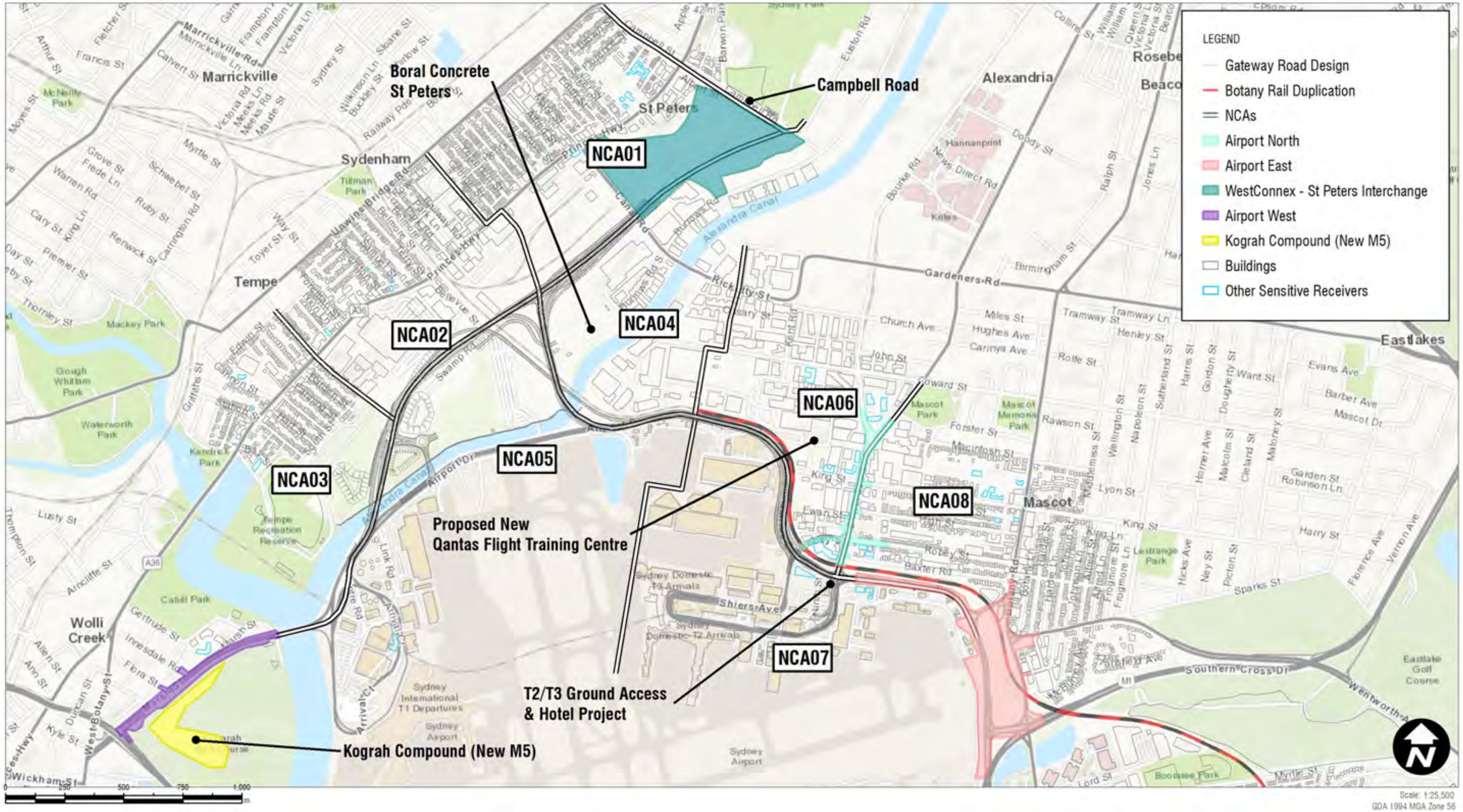


Figure 42 Other Major Construction Projects



7.1.2.1 Cumulative Impacts

- **Airport East Precinct** – while the Airport East project area overlaps with the eastern section of Sydney Gateway road project, the works are likely to be complete before Sydney Gateway road project begins.
- **Airport North Precinct** – the Airport North works are likely to be completed prior to works beginning on Sydney Gateway road project.
- **WestConnex New M5** – construction of WestConnex New M5 is expected to be complete prior to Sydney Gateway road projects.
- **WestConnex M4–M5 Link** – construction works for WestConnex M4-M5 Link began in 2018 and are due for completion in 2023. WestConnex M4–M5 Link works may occur at the same time as Sydney Gateway road project, however, the WestConnex M4–M5 Link works would be limited to the Campbell Road compound.

  The nearest residential receivers to the Campbell Road compound are located to the immediate east on Campbell Road. These receivers are over 500 metres from Sydney Gateway road project construction works. The following is noted:

  - Daytime construction noise levels from Sydney Gateway road project are predicted to be compliant at these receivers for all assessed scenarios
  - During the evening, 'minor' worst-case impacts are predicted that are up to 2 dB above the evening NML during the two noisiest scenarios
  - During the night-time, 'minor' worst-case impacts are also predicted, with exceedances of the night-time NML ranging between 2 and 7 dB for the three noisiest scenarios
  - The requirement for Sydney Gateway road project works outside of Standard Construction Hours near this location is expected to be infrequent
  - If works were occurring concurrently in this area on Sydney Gateway road project and WestConnex M4–M5 Link, the noise levels at the Campbell Road receivers would be dominated by the much closer WestConnex works, with a likely negligible increase in noise levels from Sydney Gateway road works.

  Based on the above, the potential for cumulative impacts on Campbell Road from WestConnex M4–M5 Link works and Sydney Gateway road project is considered low.

- **Sydney Airport T2/T3 Ground Access Solutions and Hotel Project** – the expected construction dates are unclear at this stage but would be likely to occur between 2019 and 2021. Receivers in this area are generally commercial, however, a number of hotels are located near the Joyce Drive and O'Riordan Street intersection, along with residential receivers further to the east on Baxter Road.

  The T2/T3 works could occur at the same time as Sydney Gateway road project is being constructed. The works would be similar to Sydney Gateway road project works, meaning concurrent construction could theoretically increase the worst-case noise levels in this report by around 3 dB. However, the likelihood of worst-case noise levels being generated by two different works at the same time is considered low and rather than increase construction noise levels, the impact of concurrent works on both projects would generally be expected to be an increase in the duration of noise impacts at the nearest receivers.

- **Boral Concrete St Peters Upgrade** – Boral is proposing to upgrade its existing site on Burrows Road South, in NCA04. Works are proposed in 2020 and 2021.

  The receivers surrounding the Boral Concrete St Peters site are typically large commercial warehouses. The nearest residential receivers are over 500 metres away to the north-west, near Princes Highway.

  Works could occur at the same time as Sydney Gateway road project is being constructed. However, given the low sensitivity of the surrounding commercial uses the impact of concurrent works on both projects are expected to be minimal.

Summary

Concurrent works may occur on a number of other projects at the same time as Sydney Gateway road project. Impacts from cumulative noise may be apparent where the projects overlap which is generally limited to the eastern half of the study area in NCA06, NCA07 and NCA08. Most of this potentially affected area is commercial, however, residential and 'other sensitive' receivers such as hotels are located near the intersection of Joyce Drive and O'Riordan Street.

The likelihood of cumulative construction noise impacts should be reviewed during detailed design when detailed construction schedules are available. The various projects should be scheduled with the aim of minimising concurrent works near to sensitive receivers where possible.

7.1.2.2 Consecutive Impacts

In addition to cumulative impacts, if more than one project occurs in the same area consecutively there may be a combined effect from the increased duration of impacts. This effect is termed 'construction fatigue'.

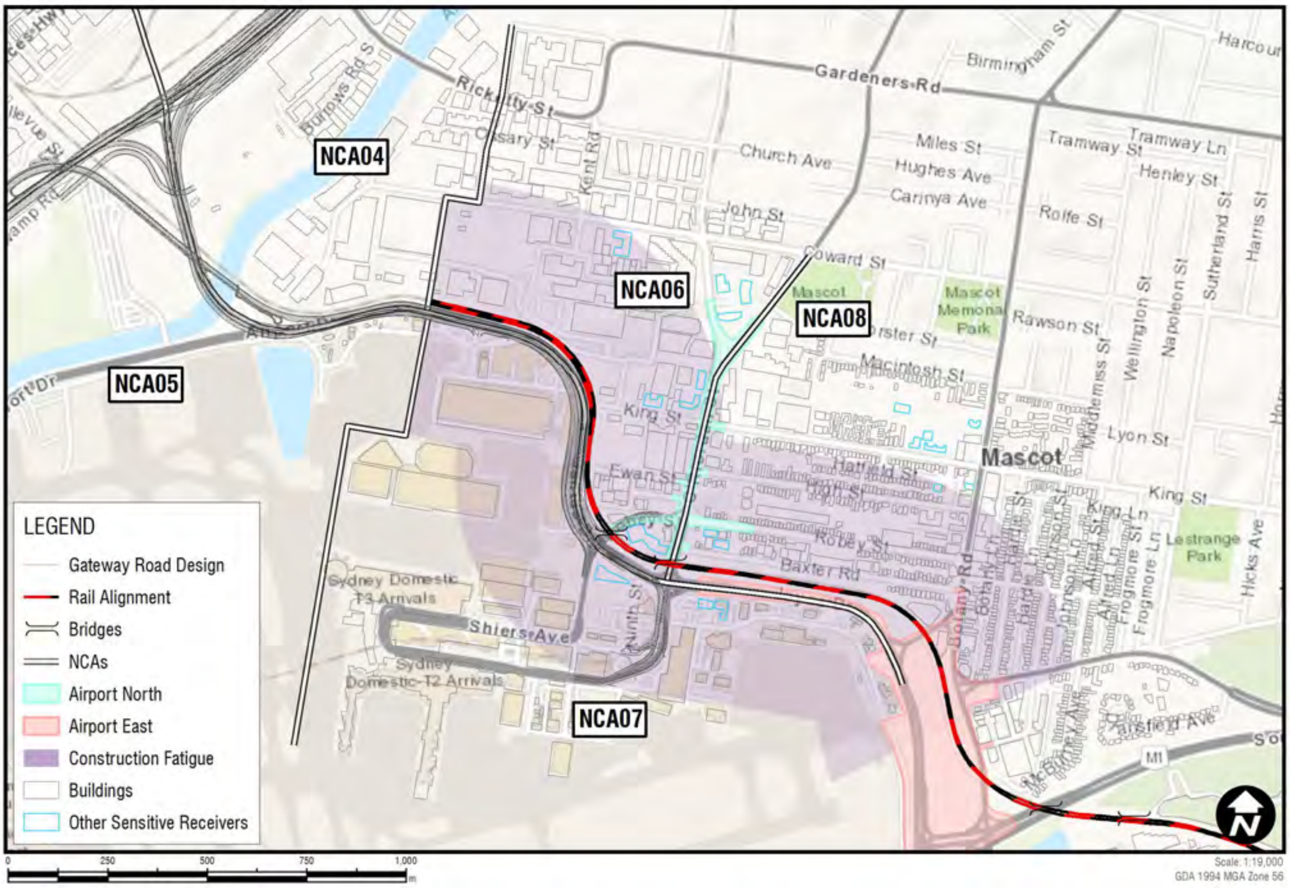
Mitigation measures aimed at short-term construction works may be less effective where receivers are affected by longer duration impacts across several projects with extensive night-time works. Where receivers are affected by 'construction fatigue', it may be necessary to consider specific mitigation and management measures to minimise the impacts.

NCA06, NCA07 and NCA08

There is potential for consecutive impacts and 'construction fatigue' at receivers in NCA06, NCA07 and NCA08. Receivers in this area, which include commercial receivers along Qantas Drive, residential properties on Baxter Road and several hotels near the Joyce Drive and O'Riordan Street intersection, have been impacted by construction works which began in 2016 and would potentially be impacted by a number of successive projects, as shown in **Table 51**.

The locations of the receivers that could be affected by construction fatigue are shown in **Figure 43**.

Figure 43 Receivers Potentially Affected by Construction Fatigue



St Peters Interchange

There is also potential for consecutive impacts at receivers near St Peters interchange. Receivers on Campbell Road have been impacted by WestConnex construction works which began in 2016, and would potentially be impacted by Sydney Gateway road project until 2023, as shown in **Table 51**.

However, as discussed in **Section 7.1.2.1**, construction of Sydney Gateway road project is predicted to result in compliant daytime noise levels for receivers on Campbell Road, with only 'minor' impacts in the evening and night-time during the noisiest work scenarios. Works outside of Standard Construction Hours are also expected to be infrequent in this area.

On this basis, construction of Sydney Gateway road project is expected to have minimal influence on construction fatigue for receivers on Campbell Road on the basis of noise alone. However, given that several construction projects have occurred in the wider area over a number of years, the Sydney Gateway road project may add to the perception of the extended nature of construction works in the area.

Summary

The potential consecutive impacts from Sydney Gateway road project and other major projects in these areas should be investigated further as the project progresses when detailed construction planning is developed. Specific management and mitigation measures designed to address potential consecutive impacts should be developed and used to minimise the impacts as far as practicable, in consultation with the affected community.

Where works on multiple projects are occurring outside of Standard Construction Hours in similar areas there is potential for increased impacts at nearby affected receivers. It is important that sufficient coordination occurs between the projects regarding evening and night-time works to ensure that appropriate respite is provided to affected receivers in accordance with the CNVG and/or the project's conditions of approval.

7.2 Operational Impacts

7.2.1 Botany Rail Duplication

Operational road traffic noise impacts from Sydney Gateway road project have been assessed against the requirements of the NSW EPA *Road Noise Policy* and the Roads and Maritime *Noise Criteria Guideline*. Operational rail traffic impacts from the Botany Rail Duplication are assessed separately against the NSW EPA *Rail Infrastructure Noise Guideline* and will be appropriately investigated in the EIS for that project.

While receivers near the Joyce Drive and O'Riordan Street intersection would potentially be affected by noise from both projects, operational noise from different types of transportation (ie road and rail) have different characteristics and result in different annoyance responses from affected communities. This means a cumulative assessment of the potential combined operational impacts is not possible as the criteria for road and rail noise impacts are markedly different.

Where elements of both projects occur in the same location, there is potential for operational mitigation measures to be required for both projects at the same receivers. The final operational mitigation strategy for each project should consider the impacts from both the road and rail project with the aim of maximising the benefit provided by the mitigation in a pragmatic way.

7.2.2 Other Proposed Major Developments

Due to the ongoing traffic growth within the Sydney road network, there is potential for increases in noise in the study area due to other projects. To capture this potential increase, a 'cumulative' traffic scenario (see **Section 4.4.6**) has been modelled which includes traffic for Sydney Gateway road project, M4 East, New M5 M4–M5 Link and other major interfacing non-approved projects that could be operational in 2036.

7.2.2.1 Cumulative Operational Road Noise Predictions without Mitigation

The receivers which have been identified as eligible for consideration of 'additional noise mitigation' in the 'cumulative' scenario are shown in **Table 52**. A comparison with the previous predictions for the Sydney Gateway road project alone (see **Table 46**) is provided.

Table 52 Receivers Considered for Additional Noise Mitigation

NCA	Triggered Buildings				Difference	
	Sydney Gateway road project alone		Cumulative			
	Residential	Other Sensitive	Residential	Other Sensitive	Residential	Other Sensitive
NCA00	9	-	9	-	-	-
NCA01	78	5	71	5	-7	-
NCA02	2	-	2	-	-	-
NCA03	119	1	105	1	-14	-
NCA04	-	-	-	-	-	-
NCA05	-	-	-	-	-	-
NCA06	1	4	1	4	-	-
NCA07	-	3	-	3	-	-
NCA08	22	2	21	2	-1	-
Sub Total	**231**	**15**	**209**	**15**	**-22**	**-**
TOTAL	**246**		**224**		**-22**	

The Cumulative scenario results in 22 fewer triggered receivers, which is due to less traffic using some of the roads around Sydney Gateway road project when the other infrastructure projects become operational.

8 Recommended Mitigation Measures

8.1 Construction Impacts

The ICNG acknowledges that due to the nature of construction works it is inevitable that there will be impacts where construction is near to sensitive receivers. Examples of potential mitigation and management measures which could be applied to the project to minimise the impacts are provided below.

The need to swiftly and efficiently undertake construction should be balanced against the communities' willingness to tolerate the level of noise predicted. Respite periods would be used to help alleviate the noise burden of some activities, noting the need to undertake specific works outside of Standard Construction Hours is largely due to the need to maintain the operation of the affected road network during peak times and restrictions posed by aviation operations at Sydney Airport. Justification for works outside of Standard Construction Hours is provided in **Section 4.1.1.1**.

Site specific Construction Noise and Vibration Impact Statements (CNVIS) would be prepared for all works outside Standard Construction Hours likely to exceed the relevant NMLs (including the operation of compounds), activities likely to result in Highly Noise Affected receivers and/or activities likely to generate vibration levels at receivers in excess of the relevant criteria. The mitigation measures would be consistent with the 'standard' and 'additional mitigation measures' contained in the Roads and Maritime *Construction Noise and Vibration Guideline* (CNVG) or any relevant conditions of approval.

8.1.1 Project Specific Construction Mitigation Measures

The assessment predicts impacts are likely during certain construction activities in some locations of the project. On the basis of the predictions, **Table 53** lists the project-specific mitigation measures which are recommended to be used to minimise the impacts. Items where further investigation has been recommended in later stages of the project are also listed.

Table 53 Recommended Project Specific Noise Mitigation Measures and Further Investigations

Item	Discussion and Recommendations
Construction Noise and Vibration Management Plan	A Construction Noise and Vibration Management Plan should be prepared before any works begin which would include: • Identification of nearby sensitive receivers • Description of works, construction equipment and hours works would be completed in • Criteria for the project and relevant licence and approval conditions • Requirements for noise and vibration monitoring • Details of how community consultation would be completed • Procedures for handling complaints • Details on how respite would be applied where ongoing high impacts are seen at certain receivers. The Construction Noise and Vibration Management Plan should consider cumulative construction impacts and the likelihood for 'construction fatigue' from consecutive projects in the areas which have substantial night-time works.

Item	Discussion and Recommendations
Construction noise and vibration assessments	Location and activity specific noise and vibration impact assessments should be carried out prior to (as a minimum) activities: • With the potential to result in noise levels above 75 dBA at any receiver • Required outside Standard Construction Hours likely to result in noise levels in greater than the relevant Noise Management Levels • With the potential to exceed relevant criteria for vibration. The assessments should confirm the predicted impacts at the relevant receivers in the vicinity of the activities to aid the selection of appropriate management measures, consistent with the requirements of the CNVG.
Construction noise exceedances	The assessment has identified that high impacts are likely when noise intensive equipment such as rockbreakers or concrete saws are in use, especially during evening and night-time periods. Residential receivers are predicted to have 'high' impacts in NCA03 and NCA08 during the evening and night-time when the noisiest construction works are nearby. Where noise intensive equipment is to be used near sensitive receivers, the works should be scheduled for Standard Construction Hours, where possible. If it is not possible to restrict the works to the daytime then they should be completed as early as possible in each work shift. Appropriate respite should also be provided to affected receivers in accordance with the CNVG and/or the project's conditions of approval.
Compounds with long term works	Hoarding, or other shielding structures, should be used where receivers are impacted near compounds or fixed works areas with long durations. To provide effective noise mitigation, the barriers should break line of sight from the nearest receivers to the works and be of solid construction with minimal gaps.
Impacts at hotels	The construction noise assessment in **Section 5.5** identified the potential for 'high' impacts outside Standard Construction Hours at a number of hotels, particularly around the entrance to Terminal 1. The NML for sleeping areas in hotels relates to the internal noise level inside rooms and the assessment conservatively assumed a 20 dB reduction to estimate internal noise levels from external noise model predictions. The hotels, however, have high performance facades and glazing to mitigate high existing noise levels near to Sydney Airport and the assumed 20 dB reduction is considered conservative. Due to the potential for large amounts of work outside Standard Construction Hours near to hotels and the sensitivity of patrons to sleep disturbance impacts, further investigation of hotels has been completed and is documented in SLR Memo *610.17858-M01-v0.1 Gateway Hotels*. The facade and glazing specifications for the likely most affected hotel rooms were inspected, in consultation with the hotel operators, to estimate representative external to internal transmission loss factors. From these investigations, external criteria are able to be developed for each hotel that, when complied with, would be expected to result in acceptable internal noise levels inside affected hotel rooms. Notwithstanding, location and activity specific noise and vibration impact assessments should be completed when detailed construction planning information is available for works near hotels. The assessments should take into account the estimated facade transmission loss factors to assess potential internal noise levels within hotel rooms and to determine appropriate external noise level criteria.
Qantas Flight Training Centre	The Qantas Flight Training Centre has several specialist flight simulators and other areas that are potentially highly sensitive to noise and vibration impacts. A strategy to manage the potential construction impacts, including site specific criteria, should be developed in consultation with Qantas and Sydney Airport Corporation as detailed construction planning progresses.
Monitoring	Monitoring should be carried out at the start of new noise and vibration intensive activities to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVG have been implemented.

Item	Discussion and Recommendations
Rockbreakers	Where rockbreakers are predicted to result in 'high' airborne, ground-borne and/or vibration impacts during sensitive periods at nearby receivers, such as at the Qantas Flight Training Centre, alternative methods of demolition should be investigated which avoid hydraulic/pneumatic hammering. These can include shears, pulveriser or ripper attachments fitted onto the excavators.
Vibration from Impact piling	A review of vibration from impact piling should be completed at a later stage of the project when information regarding the required equipment is known, including hammer weight and drop height.
Vibration works within minimum working distance	Where works are within the minimum working distances and considered likely to exceed the cosmetic damage criteria (see to **Figure 25**): • Different construction methods with lower source vibration levels should be investigated and implemented, where feasible • Attended vibration measurements should be undertaken at the start of the works to determine actual vibration levels at the item. Works should be ceased if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria.
	Certain receivers in the study area are within the human comfort minimum working distance (see **Figure 25**) and occupants of affected buildings may be able to perceive vibration impacts when vibration intensive equipment is in use. The potential human comfort impacts and requirement for vibration intensive works should be reviewed as the project progresses.
Building condition surveys	Building condition surveys should be completed before and after the works where buildings or structures are within the minimum working distances and considered likely to exceed the cosmetic damage criteria during the use of vibration intensive equipment.
Vibration impacts on pipework	The susceptibility of pipeline assets in the study area to construction vibration, together with appropriate monitoring and management protocols, should be developed in consultation with the relevant asset owners.
Heritage items	Sections of Alexandra Canal and Cooks River Container Terminal have been identified as within the cosmetic damage minimum working distances. The requirement for vibration intensive works near to heritage items should be reviewed during detailed construction planning. Where heritage items are considered potentially sensitive to vibration impacts, the more stringent DIN 4150 Group 3 guideline values should be applied and monitoring should be completed when vibration intensive works are in close proximity.

Item	Discussion and Recommendations
Community preference	Consultation with the affected community has occurred for the preliminary and concept design of the project in a number of ways, including meetings, communication of project information and invitations to project displays. Issues raised during consultation were provided to the project design and environmental teams to inform the project development and environmental assessment. Specific concerns were raised by the community regarding potential construction noise impacts in Tempe and Mascot. It is noted that the majority of works near Tempe would likely be able to be completed during Standard Construction Hours, with minimal requirement for evening or night-time works. In Mascot, while night-time works would be required at certain times, the impacts on residential receivers are generally 'minor' during most of the assessed scenarios. Isolated 'high' impacts are, however, likely when *Enabling Works* using rockbreakers or concrete saws are completed near receivers (ie near Baxter Road). High impacts in this area would be managed using the approaches outlined above, such as completing noisy works during daytime hours where possible, completing noisy works early in the shift where they are required at night, use of appropriate respite, etc. In all locations where impacts from the project are predicted, further engagement with the affected communities should be undertaken during detailed design to determine their preference for mitigation and management measures. Further information regarding the consultation process and outcomes to date as well as proposed future consultation to be conducted are provided in the EIS (Chapter 4: Consultation) and the *Community and Stakeholder Consultation Report* (in Appendix E).
	It is noted that previous feedback from the community indicated a preference for a noise mound to be used to mitigate operational noise impacts near Tempe. Residents also requested for vegetation to be planted close to noise mounds to help reduce the visual impact and support local flora and fauna, where possible. Following exhibition of the combined EIS and draft MDP, the project would progress to detailed design. During this phase Roads and Maritime would continue to consult with the community and Inner West Council to develop the urban design landscape plan. This could include aspects such as the look and feel of noise mounds/barriers, together with collecting community feedback on other proposed noise mitigation measures. Impacted communities would be notified about the engagement process by letterbox drops and invited to participate in the development of the urban design landscape plan. Sydney Gateway subscribers would also be informed of the consultation process and opportunities to provide input. This feedback, together with results of further noise modelling that would be completed during detailed design, would be considered when determining feasible and reasonable noise mitigation for the project.
Cumulative and consecutive construction impacts	The likelihood of cumulative construction noise impacts should be reviewed during detailed design when detailed construction schedules are available. Coordination should occur between the various projects to minimise concurrent works in the same areas, where possible.
	Consecutive construction impacts, or 'construction fatigue', may occur in NCA06, NCA07 and NCA08, near the Joyce Drive and O'Riordan Street intersection, due to the construction of several projects. The potential consecutive impacts from Sydney Gateway road project and other major projects should be investigated further as the project progresses. Specific additional management and mitigation measures designed to address potential consecutive impacts should be developed and used to minimise the impacts as far as practicable, in consultation with the affected community.
	Where works on multiple projects are occurring outside of Standard Construction Hours in similar areas there is potential for increased impacts at nearby affected receivers. Sufficient coordination should occur between the projects regarding evening or night-time works to ensure that appropriate respite is provided to affected receivers in accordance with the CNVG and/or the project's conditions of approval.

8.1.2 Construction Noise and Vibration Guideline Mitigation

8.1.2.1 Standard Mitigation Measures

The Roads and Maritime *Construction Noise and Vibration Guideline* (CNVG) contains a number of 'standard mitigation measures' for mitigating and managing construction impacts on infrastructure projects. The measures are shown in **Appendix D** and should be applied where feasible and reasonable to minimise the impacts from the works as far as practicable.

8.1.2.2 Additional Construction Mitigation Measures

The CNVG defines how 'additional mitigation measures' are applied to airborne noise impacts, ground-borne noise impacts and potential human comfort vibration impacts. The approach for each is shown in **Table 54**, **Table 55** and **Table 56**, respectively.

Table 54 CNVG Triggers for Additional Mitigation Measures – Airborne Noise

Predicted $L_{Aeq(15minute)}$ Airborne Noise Level at Receiver			Additional Mitigation Measures	
Perception	dBA above RBL	dBA above NML	Type[1]	Mitigation Levels[2]
All hours				
75 dBA or greater			N, V, PC, RO	HNA
Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 1pm), Sun/Public Holiday (Nil)				
Noticeable	5 to 10	0	-	NML
Clearly Audible	10 to 20	<10	-	NML
Moderately Intrusive	20 to 30	10 to 20	N, V	NML+10
Highly Intrusive	>30	>20	N, V	NML+20
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Public Holiday (8am – 6pm)				
Noticeable	5 to 10	<5	-	NML
Clearly Audible	10 to 20	5 to 15	N, R1, DR	NML+5
Moderately Intrusive	20 to 30	15 to 25	V, N, R1, DR	NML+15
Highly Intrusive	>30	>25	V, IB, N, R1, DR, PC, SN	NML+25
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Public Holiday (6pm – 7am)				
Noticeable	5 to 10	<5	N	NML
Clearly Audible	10 to 20	5 to 15	V, N, R2, DR	NML+5
Moderately Intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR	NML+15
Highly Intrusive	>30	>25	AA, V, IB, N, PC, SN, R2, DR	NML+25

Note 1: N = Notification, SN = Specific Notification, PC = Phone Calls, IB = Individual Briefings, R1 = Respite Period 1, R2 = Respite Period 2, RO = Project Specific Respite Offer, DR = Duration Respite, AA = Alternative Accommodation, V = Verification.

Note 2: NML = Noise Management Level, HNA = Highly Noise Affected (ie 75 dBA or greater for residential receivers).

Table 55 CNVG Triggers for Additional Mitigation Measures – Ground-borne Noise

Predicted Ground-borne $L_{Aeq(15minute)}$ Noise Level at Receiver		Additional Mitigation Measures	
Perception	**dBA above GB NML**	**Type[1]**	**Apply to[2]**
Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 1pm), Sun/Public Holiday (Nil)			
N/A	Vibration only applicable during standard hours	-	-
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Public Holiday (8am – 6pm)			
Clearly Audible	< 10	N	All
Moderately Intrusive	10 to 20	V, N, R1, DR, SN	All
Highly Intrusive	>20	V, IB, N, PC, SN, R1, DR	All
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Public Holiday (6pm – 7am)			
Clearly Audible	< 10	V, N, SN	All
Moderately Intrusive	10 to 20	AA, V, IB, N, PC, RP, SN, R2, DR	All
Highly Intrusive	>20	AA, V, IB, N, PC, RP, SN, R2, DR	All

Note 1: N = Notification box drops, SN = Specific Notification, PC = Phone Calls, IB = Individual briefings, R1 = Respite Period 1, R2 = Respite Period 2, DR = Duration Respite, AA = Alternative Accommodation, V = Validation of predicted noise levels.

Note 2: All affected receivers.

Table 56 CNVG Triggers for Additional Mitigation Measures – Human Comfort Vibration

Predicted Vibration Level at Receiver	Additional Mitigation Measures	
	Type[1]	**Apply to**
Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 1pm), Sun/Public Holiday (Nil)		
Predicted vibration exceeds maximum human comfort levels	V, N, RO	All
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Public Holiday (8am – 6pm)		
Predicted vibration exceeds maximum human comfort levels	V, IB, N, RO, PC, RP, SN	All
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Public Holiday (6pm – 7am)		
Predicted vibration exceeds maximum human comfort levels	AA, V, IB, N, PC, RP, SN	All

Note 1: N = Notification drops, SN = Specific Notification, PC = Phone Calls, IB = Individual Briefings, RO = Project Specific Respite Offer, AA = Alternative Accommodation, V = Validation of predicted noise levels.

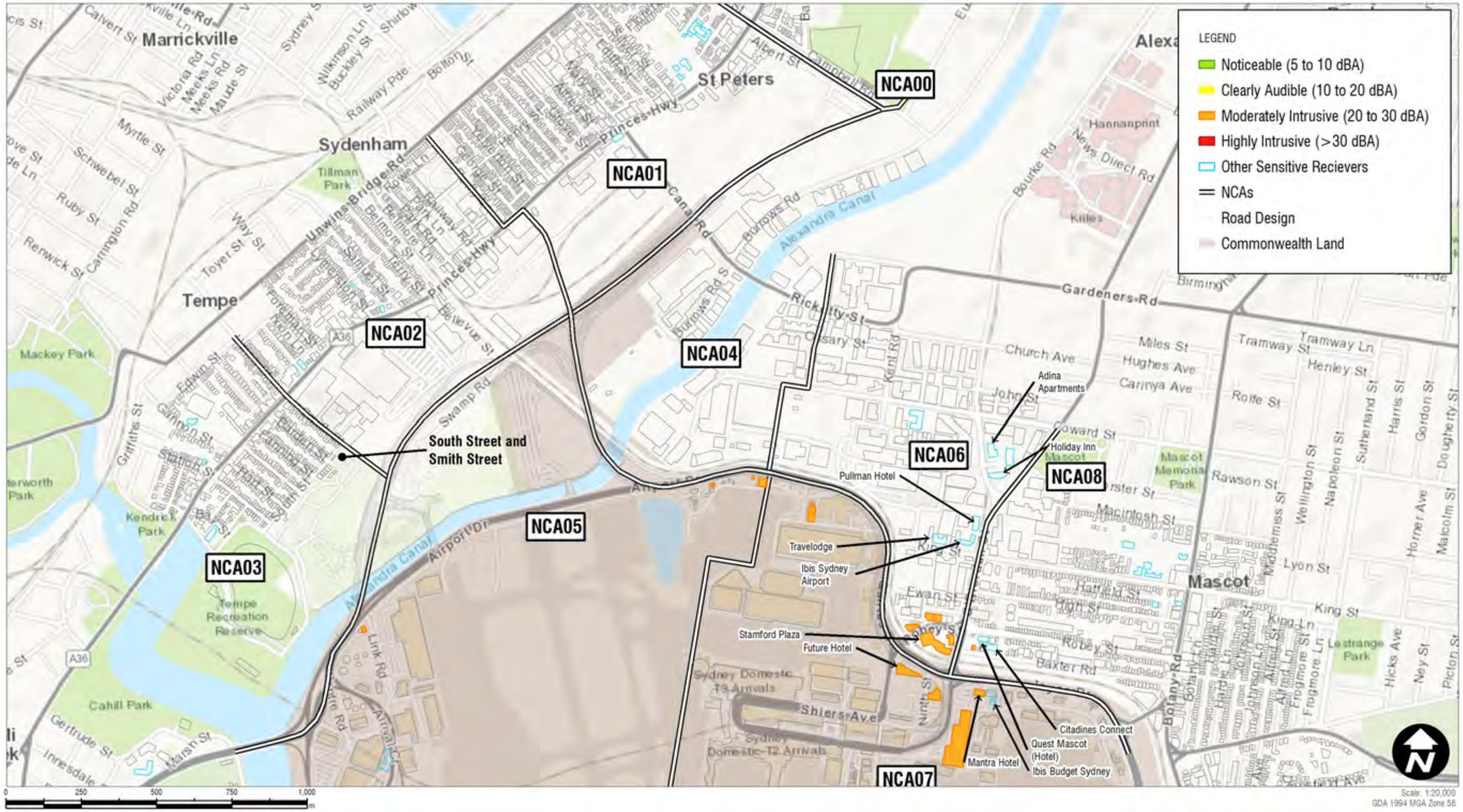
Using the airborne noise construction predictions in **Section 5**, indicative worst-case 'additional mitigation measures' for all construction works on the project have been determined as per the requirements of the CNVG (see **Table 54**). The required 'additional mitigation measures' are shown for:

- Daytime construction airborne noise – **Figure 44**
- Night-time construction airborne noise – **Figure 45**.

The figures show the required 'additional mitigation measures' based on the CNVG 'perception' categories in **Table 54**.

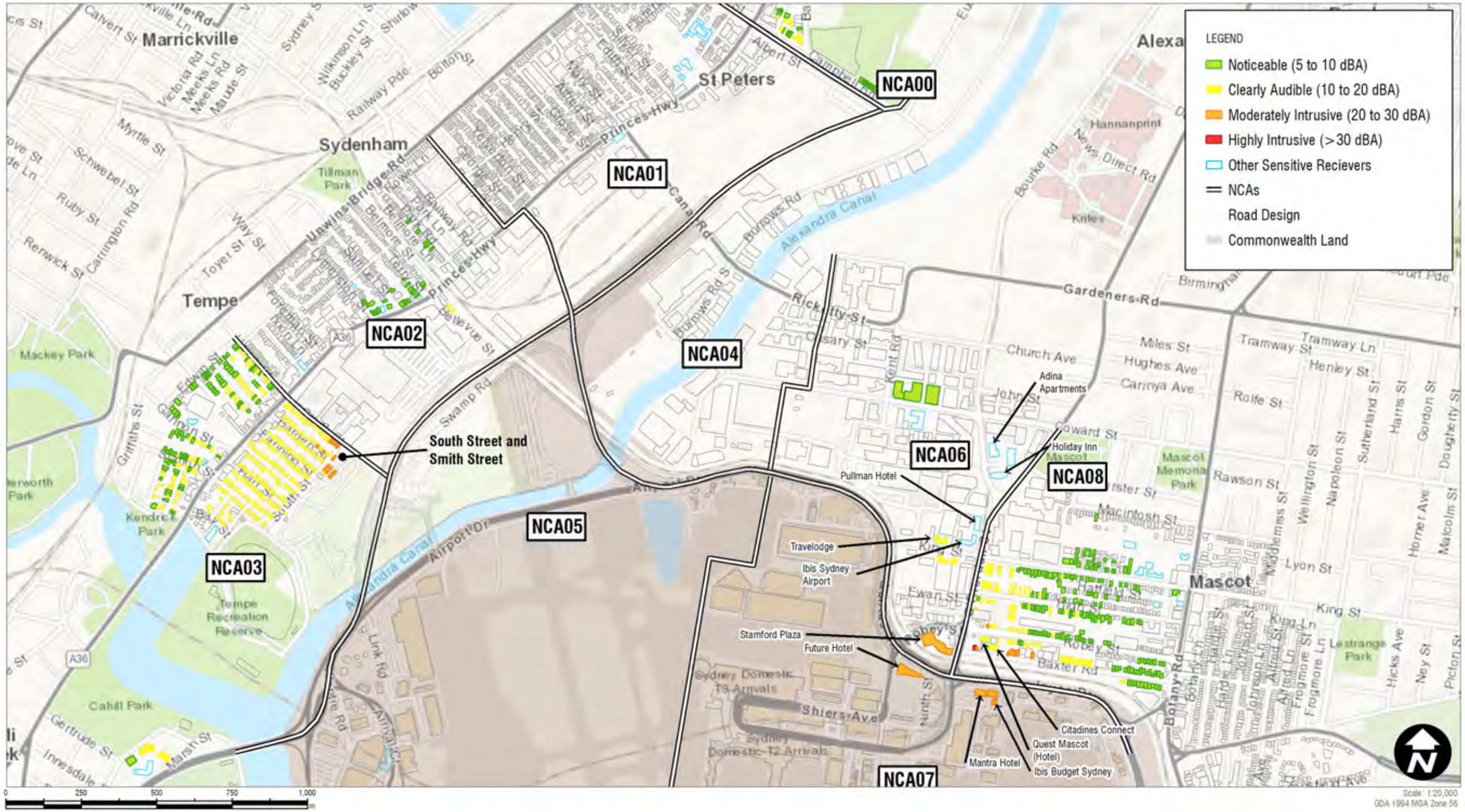
'Additional mitigation measures' for ground-borne construction noise and human comfort vibration impacts would be determined at a later stage in CNVIS assessments when detailed construction data is available.

Figure 44 Indicative Worst-case Additional Mitigation Measures for All Construction Activities during the Daytime



Note: The daytime 'Additional Mitigation Measures' are: Noticeable = nil, Clearly Audible = nil, Moderately Intrusive = N, V, Highly Intrusive = N, V (see **Table 54** for requirement definitions).

Figure 45 Indicative Worst-case Additional Mitigation Measures for All Construction Activities during the Night-time



Note: The night-time 'Additional Mitigation Measures' are: Noticeable = N, Clearly Audible = V, N, R2, DR, Moderately Intrusive = V, IB, N, PC, SN, R2, DR, Highly Intrusive = AA, V, IB, N, PC, SN, R2, DR (see **Table 54** for requirement definitions).

8.2 Recommended Operational Road Traffic Noise Mitigation Measures

Road traffic noise levels from infrastructure projects should be reduced to meet the NCG noise criteria through the use of feasible and reasonable mitigation. The assessment in **Section 6.2** predicts road traffic noise levels to the surrounding receivers without any mitigation applied to the project.

For receivers that qualify for consideration of 'additional noise mitigation', potential noise mitigation measures are to be considered in the following order of preference:

- At-source mitigation:
  - Quieter road pavement surfaces
- In-corridor mitigation:
  - Noise mounds
  - Noise barriers
- At-receiver mitigation:
  - At-property treatments.

8.2.1 At-Source Mitigation – Low Noise Pavements

The type of road surface can significantly affect road traffic noise levels at affected receivers. Concrete pavements tend to be the noisiest with low noise pavements such as open grade asphalt (OGA) being the quietest.

Low noise pavements are the preferred form of noise mitigation as they reduce source noise levels which benefits both outside areas and internal spaces. Low noise pavements have no associated visual impact and are also likely to provide noise benefits to receivers at greater distances than noise barriers. They are generally considered feasible to use where there are four or more closely spaced receivers that exceed the NCG criteria.

Road pavement surfaces and textures must meet a number of criteria besides noise performance including structural integrity, skid resistance, water shedding, maintenance requirements and design life.

Low noise pavements are generally most effective where vehicle speeds are high, such as on motorways, and less effective where traffic speeds are slower or where traffic is required to slow down or stop. It is noted that the Sydney Gateway road project would have a speed limit of 70 km/h and would have a signalised intersection which would reduce the effectiveness of low noise pavements.

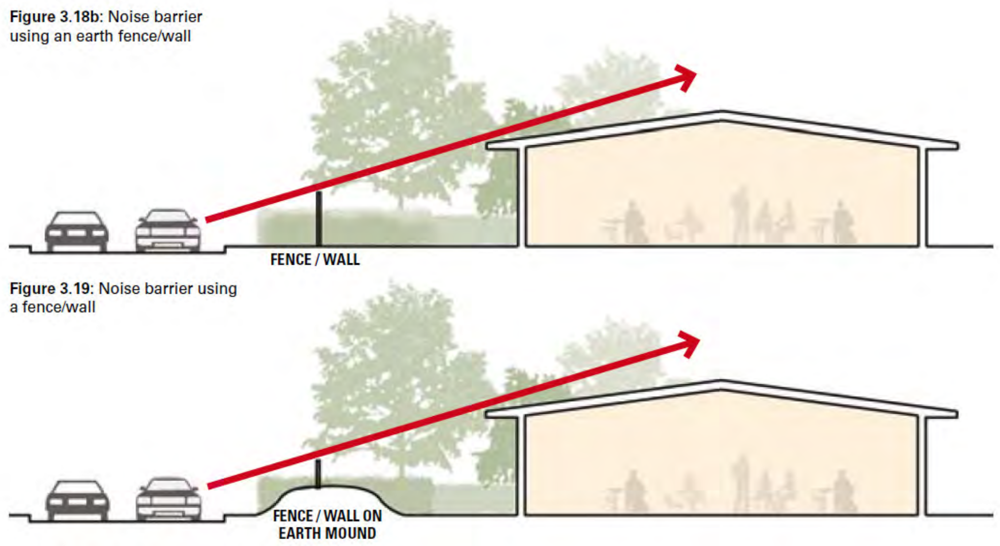
The noise assessment includes the use of quieter noise pavement in the form of dense graded asphalt across the extent of the project. The use of low noise pavements, such as OGA, are not currently considered a suitable mitigation approach for the project, however, they should be investigated further during detailed design taking into account whole-of-life engineering considerations and the overall social, economic and environmental effects.

8.2.2 In-Corridor Mitigation – Noise Barriers

After at-source mitigation has been investigated, the next approach is to consider in-corridor mitigation which aims to block line of sight from the source of noise to nearby receivers.

Noise barriers (in the form of walls or mounds) can provide significant noise reductions and also reduce both external and internal noise levels. Where space allows, raised earth mounds can be used as noise barriers and can be enhanced by placing a low wall on top. Noise walls are often more feasible than a mound as the footprint is much smaller. These methods are shown in **Figure 46**.

Figure 46 Noise Barriers



Note: Taken from DP&I *Development near Rail Corridors and Busy Roads – Interim Guideline*.

Noise barriers can, however, introduce a number of negative aspects, including access to property, aesthetic impacts, daylight access, overshadowing, drainage, graffiti, restriction of line of sight, maintenance access and safety concerns.

Noise barriers are typically most efficient when receivers are located at ground floor level. As the height of a receiver increases, the noise reduction from barriers reduces due to line of sight over the top of the barrier. Because of this, noise barriers are assessed using noise predictions at ground and first floor only, with architectural treatment of individual dwellings being used for higher floors if necessary.

Assessment of Noise Barriers

The process for determining noise barriers is described in the Roads and Maritime NMG. Noise barriers are to be considered where there are four or more closely spaced receivers with exceedances of the NMG triggers (see **Section 4.4.9**).

The scenario which results in most triggers (ie the Sydney Gateway road project alone, see **Table 52**) has been used to analyse the approximate location and mitigation benefit likely to be gained from the use of noise barriers. The preliminary locations of the barriers which are considered likely to be reasonable in accordance with the NMG procedure are shown in **Figure 47** and detailed in **Table 57**. **Appendix E** provides more details of the barrier analysis.

At this early stage in the project the noise barriers should be regarded as indicative. The final mitigation strategy for the project would be determined during the detailed design stage and would consider factors such as constructability, available space, engineering requirements, utility infrastructure, community impacts and other constraints.

Figure 47 Indicative Noise Barriers Considered for Further Investigation

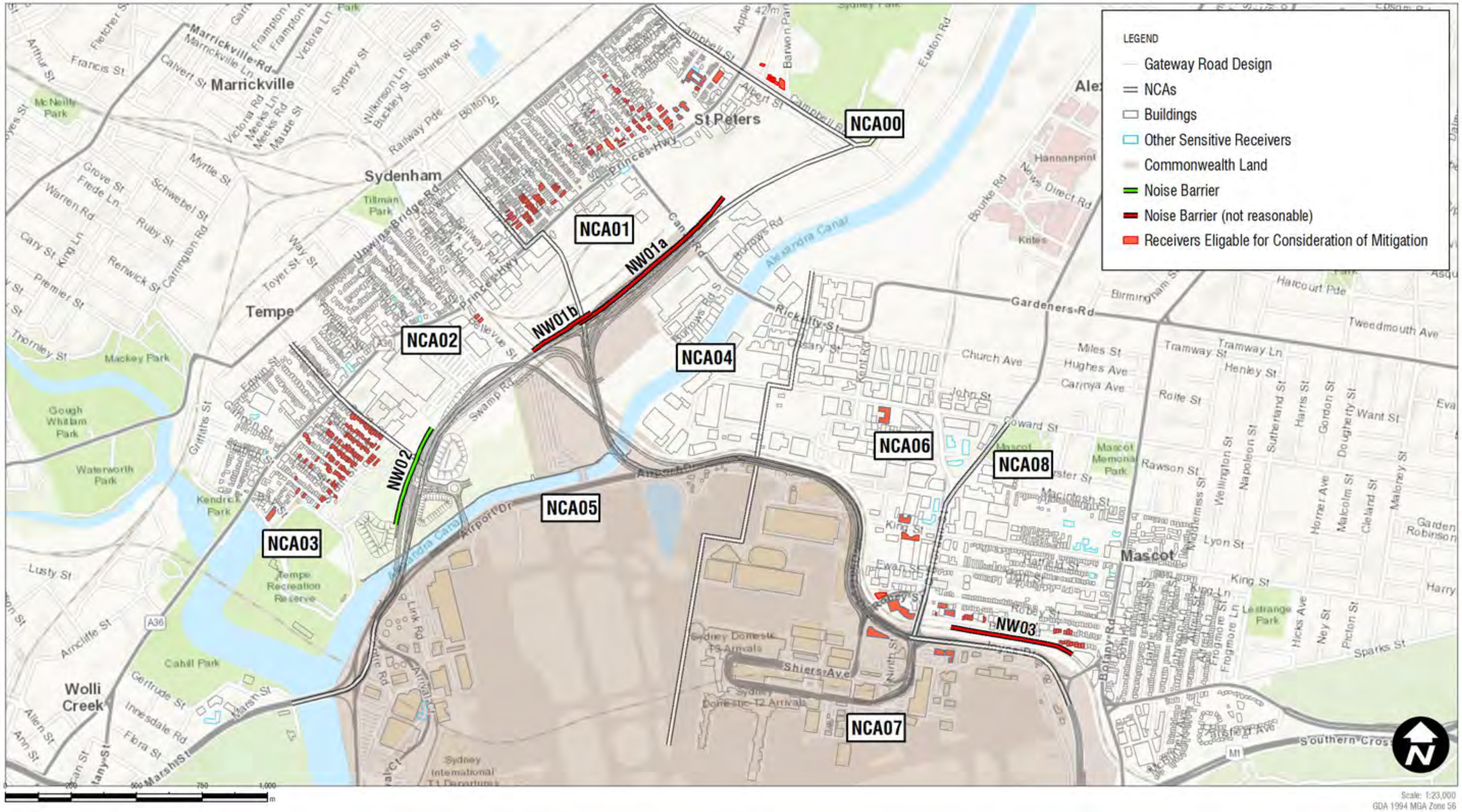


Table 57 Indicative Noise Barrier Details

Barrier ID	Noise Barrier Details						Comments
	Type	Length (m)	Height (m)[1]	Triggered Receivers[2]		Reason -able?	
				No Barrier	With Barrier		
NW01a	New	738	4.5[3]	71	39	Unlikely	While the barrier reduces the number of property treatments, it provides less than 2 dB noise benefit and does not meet the NMG minimum requirement of 5 dB for barriers less than 5 m in height. Many of the triggered receivers in this area are also only marginally over the criteria (around 1 to 2 dB), which is within the accuracy limitation of noise modelling. Barrier unlikely to be considered reasonable to construct due to minimal noise benefit.
NW01b	New	266					
NW02	New	398	5.0[4]	131	30	Yes	The optimised barrier height of 6.0 m does not meet the NMG minimum requirement of 10 dB benefit for barriers over 5 m in height and is not reasonable to construct. The initial design of 3.0 m similarly does not meet the 5 dB requirement for barriers less than 5 m in height. A barrier height of 5.0 m is recommended as it provides 5 dB benefit and barrier performance gains diminish after this point. The community has indicated a preference for a noise mound in this area. Given the space available, further investigation regarding the use of a mound in lieu of a noise barrier should occur during detailed design in consultation with the affected community.
NW03	New	479	4.5[4]	28	9	Unlikely	On the south side of the rail corridor, the presence of utilities restricts potential noise barrier locations to either adjacent Joyce Drive or the rail corridor. A noise barrier near Joyce Drive would obscure the billboards and a barrier adjacent to the rail corridor would require removal of the billboards, both of which substantially impact the billboard owners/advertisers. On the northern side of the rail corridor there is a car park near Baxter Road that has been sub-divided for future development. A noise barrier here would require easements for maintenance access, which would substantially restrict the amount land available for future development. For these reasons, a noise barrier in this area is unlikely to be reasonable to construct.

Note 1: Recommended height is subject to further considerations during detailed design such as construction limitations, overshadowing, urban design and community preference.

Note 2: The count of 'Triggered Receivers' represents the number of individual floors (at ground and first level only) of the affected buildings.

Note 3: The height is relative to the adjacent carriageway level as the ground below the barrier is undulating.

Note 4: The height is relative to road design or ground below the barrier.

8.2.3 At-Property Mitigation – Architectural Treatment

Where residual impacts remain after the use of at-source and in-corridor mitigation, the final approach is to use at-property mitigation. This typically involves using architectural treatments such as thicker glazing and doors, or upgraded facade constructions to achieve appropriate internal noise levels.

At-property mitigation can potentially be used in place of at-source and in-corridor mitigation, such as where receivers are not grouped together or where there is community preference. These treatments are generally limited to architectural upgrades to building elements and the installation of acoustic screen walls close to the receiver where they also protect outdoor living spaces.

Architectural treatments are more effective when they are applied to masonry buildings compared to lightly clad timber framed structures, and caution should be taken before providing treatments to buildings in a poor state as they may not be effective.

The architectural treatments provided are typically limited to:

- Fresh air ventilation systems that meet the National Construction Code of Australia requirements with the windows and doors shut
- Upgraded windows and glazing and solid core doors on the exposed facades of the substantial structures only (eg masonry or insulated weather board cladding with sealed underfloor). These techniques would be unlikely to produce any noticeable benefit for light frame structures with no acoustic insulation in the walls
- Upgrading window or door seals and appropriately treating sub-floor ventilation
- The sealing of wall vents
- The sealing of the underfloor below the bearers
- The sealing of eaves.

The final operational noise mitigation strategy would be determined as the project progresses and would likely use a combination of the approaches discussed in this report.

Identification of residual noise impacts and receivers eligible for consideration of at-receiver noise treatments would be undertaken after finalisation of the at-source and in-corridor mitigation measures. Receivers that are identified as requiring at-receiver noise mitigation should be identified and offered treatment prior to the start of construction works, which have the potential to affect them.

The final mitigation strategy should, however, consider that the receivers which are affected by the project are already subject to high existing noise levels from existing sources of road, rail and aircraft noise. The following items should be considered further when determining eligibility:

- Certain receivers may already have been mitigated with at-property treatment under the Roads and Maritime Noise Abatement Program.
- Receivers may already have been mitigated with at-property treatment under the Sydney Airport noise insulation programme following the opening of the third runway.
- Recently built receivers would have been designed and constructed with increased facade specifications to control high existing noise levels near Sydney Airport, as per the requirements of the State Environmental Planning Policy Infrastructure (2007) and relevant council Development Control Plan.

- For units in multi-storey buildings, noise levels and eligibility should be assessed at the facades of the affected dwellings.
- Fire safety risks associated with external wall cladding.
- Potential limitations regarding the installation of treatments due to access constraints.

Port Botany Duplication is also likely to impact similar receivers to Sydney Gateway road project. Where elements of both projects occur in the same location, there is potential for operational mitigation measures to be required for both projects at the same receivers. The final operational mitigation strategy for each project should consider the impacts from both the road and rail project with the aim of maximising the benefit provided by the mitigation in a pragmatic way.

8.3 Recommended Airport Ground-based Operational Noise Mitigation Measures

The worst-case ground-based impacts are predicted to be during engine ground running due to the high noise levels emitted by this activity. It is noted that aircraft ground-based noise is already a feature of the site and existing noise levels from such activities likely already exceed the nominated criteria.

The options for mitigating ground-based aircraft noise impacts are limited. Shielding the source of noise using a noise barrier or similar structure to reproduce the noise benefit provided by the removed existing jet base buildings would likely be the most appropriate form of mitigation, noting that the existing buildings have relatively large gaps between them and do not act a as continuous barrier along the jet base boundary.

The following measures are recommended to be considered as the project progresses:

- Investigate feasible and reasonable options to replace the jet base buildings that the project would remove with appropriate barriers or structures to minimise noise propagation from ground-based airport activities. The investigation should consider the mitigation of potential increases in noise levels from building removal in the context of existing noise levels from airport activities and should be completed in consultation with Sydney Airport Corporation.
- Investigate the possibility of only partial demolition of jet base buildings affected by the project. If parts of these buildings are able to be retained the increase in ground-based noise impacts at receivers to the east of the airport would be reduced. The assessment currently assumes full demolition and therefore represents a worst-case scenario.

9 Conclusion

Roads and Maritime and Sydney Airport Corporation are proposing the Sydney Gateway road project. The project comprises new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's terminals and beyond. The project site includes freehold land and Commonwealth-owned land leased by Sydney Airport Corporation.

This Noise and Vibration Technical Working Paper has been prepared to address the project SEARs and the requirements for a MDP under the Airports Act. The report describes the existing noise environment in the study area, outlines the method used in the assessment and identifies the likely impacts from construction and operation of the project on the nearby communities and sensitive receivers. Where impacts are predicted, appropriate measures have been recommended to mitigate and manage the impacts

Construction Noise and Vibration

The nearest receivers in most sections of the study area are relatively distant meaning the construction noise impacts across the project as a whole are relatively low. However, consistent with most major infrastructure projects in urban areas, noise impacts during some works are predicted to be 'high', particularly when noise intensive equipment such as rockbreakers or concrete saws are in use near to receivers.

The construction noise impacts at **residential receivers** are generally limited to receivers to the north of Tempe Recreation Reserve (in NCA03) and near the intersection of Joyce Drive and O'Riordan Street (in NCA08). The other catchments either have no residential receivers or receivers are sufficiently far from the works to generally be compliant with the management levels.

'High' impacts are likely at some of the nearest receivers when noise intensive equipment is in use. Noise intensive equipment would, however, only be required for relatively short periods and noise levels and impacts during typical works would be significantly lower and generally result in either compliant noise levels or 'minor' impacts.

The closest **hotels** to the project site are near the Joyce Drive and O'Riordan Street intersection and are likely to be subject to 'high' worst-case impacts. Notwithstanding, these hotels would have high performance facades and glazing, which could potentially reduce construction noise impacts to acceptable internal levels.

'Moderate' worst-case impacts are seen at the nearest **commercial receivers** when noise intensive equipment is in use. Noise levels and exceedances during typical works are significantly lower and mostly compliant with the management levels.

The main potential sources of construction **vibration** are from vibratory rollers, rockbreakers and piling equipment. The distance between the construction works and the nearest sensitive receivers is generally sufficient for most structures to be unlikely to suffer cosmetic damage. A small number of structures which are close to the project are, however, within the minimum working distances, including a number of heritage items.

The project would apply all feasible and reasonable work practices to reduce the potential impacts. The exact strategies would be determined as the project progresses. Site specific Construction Noise and Vibration Impact Statements would be prepared for all works outside Standard Construction Hours likely to exceed the relevant management levels.

Consecutive construction impacts, or 'construction fatigue', from extended impacts from Sydney Gateway road project and other major projects may occur in Mascot in NCA06, NCA07 and NCA08. While each project would apply mitigation measures that are suitable for controlling impacts from that project in isolation, the measures may not be sufficient to address impacts from extended works. The potential for 'construction fatigue' should be investigated further as the project progresses. Specific additional management and mitigation measures designed to address potential consecutive impacts should be developed to minimise the impacts as far as practicable.

Operational Road Traffic Noise

The urban nature of the study area means that many of the affected receivers are close to major existing roads and already subject to relatively high existing road traffic noise levels.

The project would introduce new sources of road traffic noise to some parts of the study area, mainly in the west around Tempe, while also widening and increasing traffic volumes on other existing roads, such as Qantas Drive and Joyce Drive. Because of this, the project is predicted to result in substantial increases in road traffic noise levels (ie greater than 2 dB) in certain areas, including:

- To the north of Princes Highway (in NCA01), where the project is predicted to result in increases of up to 5 dB
- Receivers in Tempe to the north Tempe Recreation Reserve (in NCA03), where increases of up to 13 dB are predicted
- Receivers near the Joyce Drive and O'Riordan Street intersection (in NCA06 and NCA07), where increases of up to 4 dB are predicted
- On Baxter Road, Mascot (in NCA08), where increases of up to 3 dB are predicted.

A total of 246 receiver buildings (359 individual floors) are predicted to have exceedances of the operational road traffic noise criteria and have been identified as being eligible for consideration of additional noise mitigation.

Noise mitigation to minimise the impacts has been investigated, including quieter road pavement surfaces, noise barriers and at-property architectural treatments.

The assessment concluded that a noise barrier to the north of the alignment at Tempe (in NCA03) may be reasonable to construct and should be considered further during detailed design. Residual impacts would likely be mitigated using at-property treatment.

Ground-based Airport Noise

The project is predicted to increase aircraft related ground-based operational noise impacts from Sydney Airport in the following locations:

- At receivers north of Tempe Recreation Reserve (in NCA03), where noise levels are predicted to increase by up to 3 dB at residential receivers due to the removal of shipping containers
- At receivers near O'Riordan Street in Mascot (in NCA06 and NCA08), where the demolition of several airport buildings adjacent to Qantas Drive is predicted to increase noise levels for receivers to the east by up to 16 dB. The majority of this area is commercial, however, other sensitive receivers (hotels and one residential apartment block) would also potentially be affected. Lesser increases are predicted for the residential areas further to the east.

The worst-case impacts were predicted during engine ground running. The options for mitigating such impacts are limited due to the high noise associated with engines. It is recommended that the project investigates feasible and reasonable options to replace the jet base buildings that the project would remove and/or investigate the possibility of only partial demolition of the affected jet base buildings.

It is noted that aircraft ground-based noise is already a feature of the site and existing noise levels from such activities likely already exceed the criteria.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

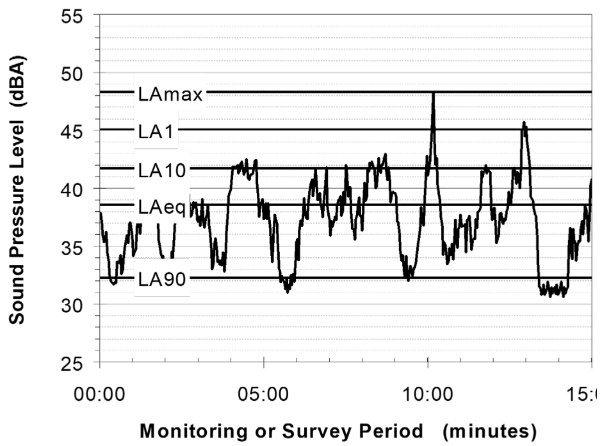
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

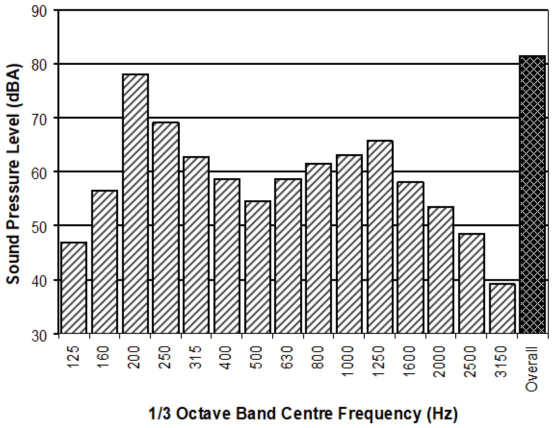
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

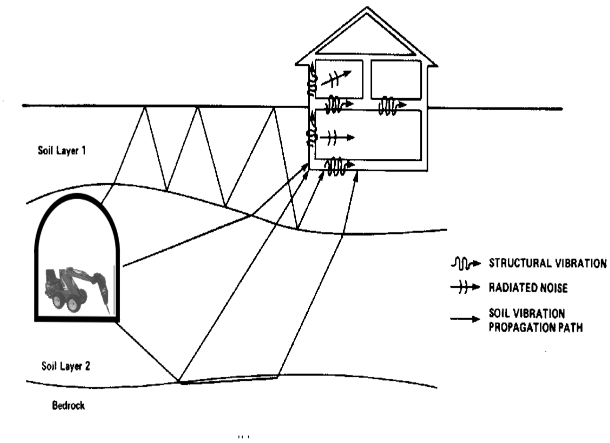
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



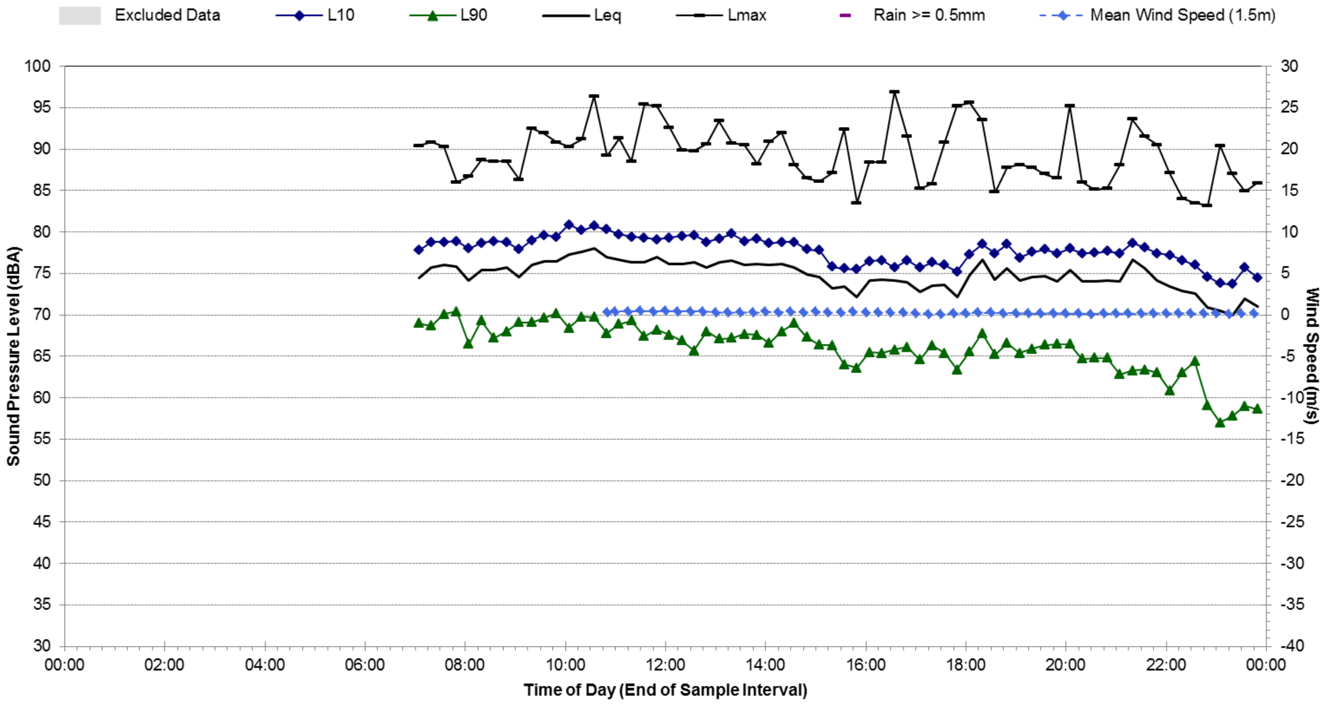
The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Noise Monitoring Data

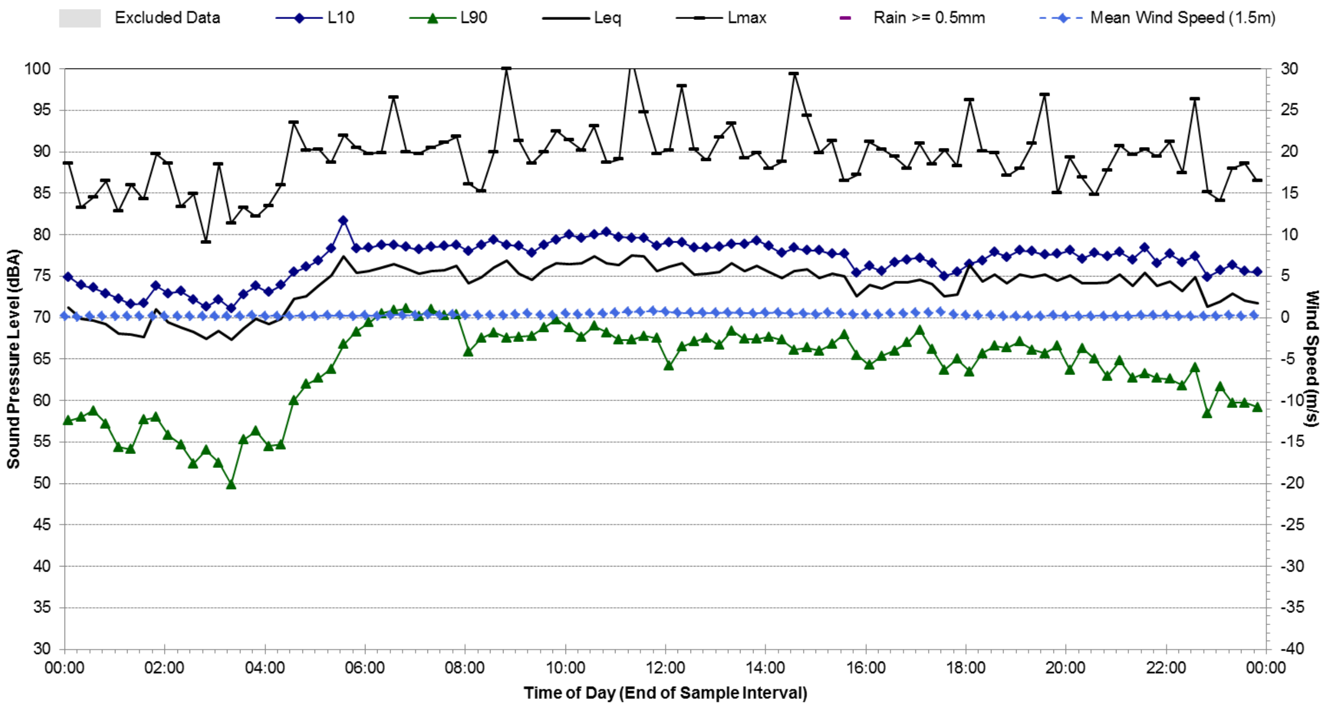
Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Monday, 22 July 2019



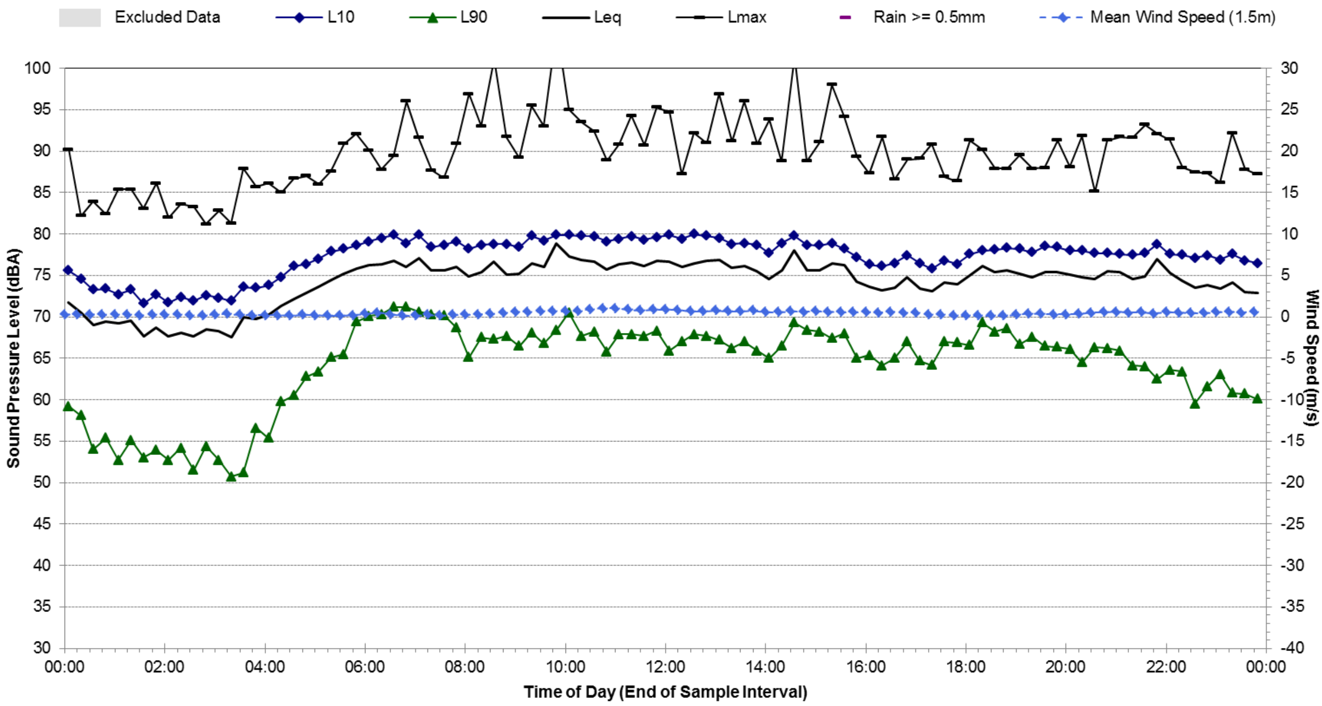
Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Tuesday, 23 July 2019



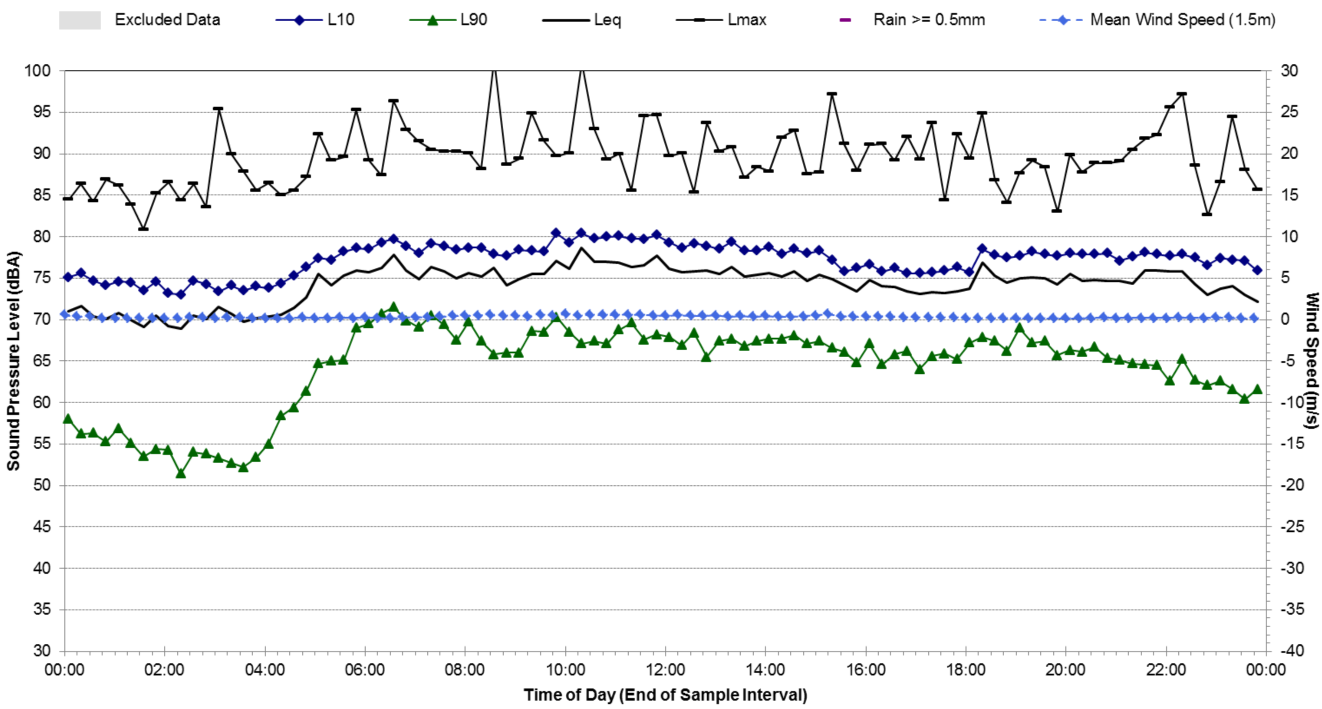
Statistical Ambient Noise Levels

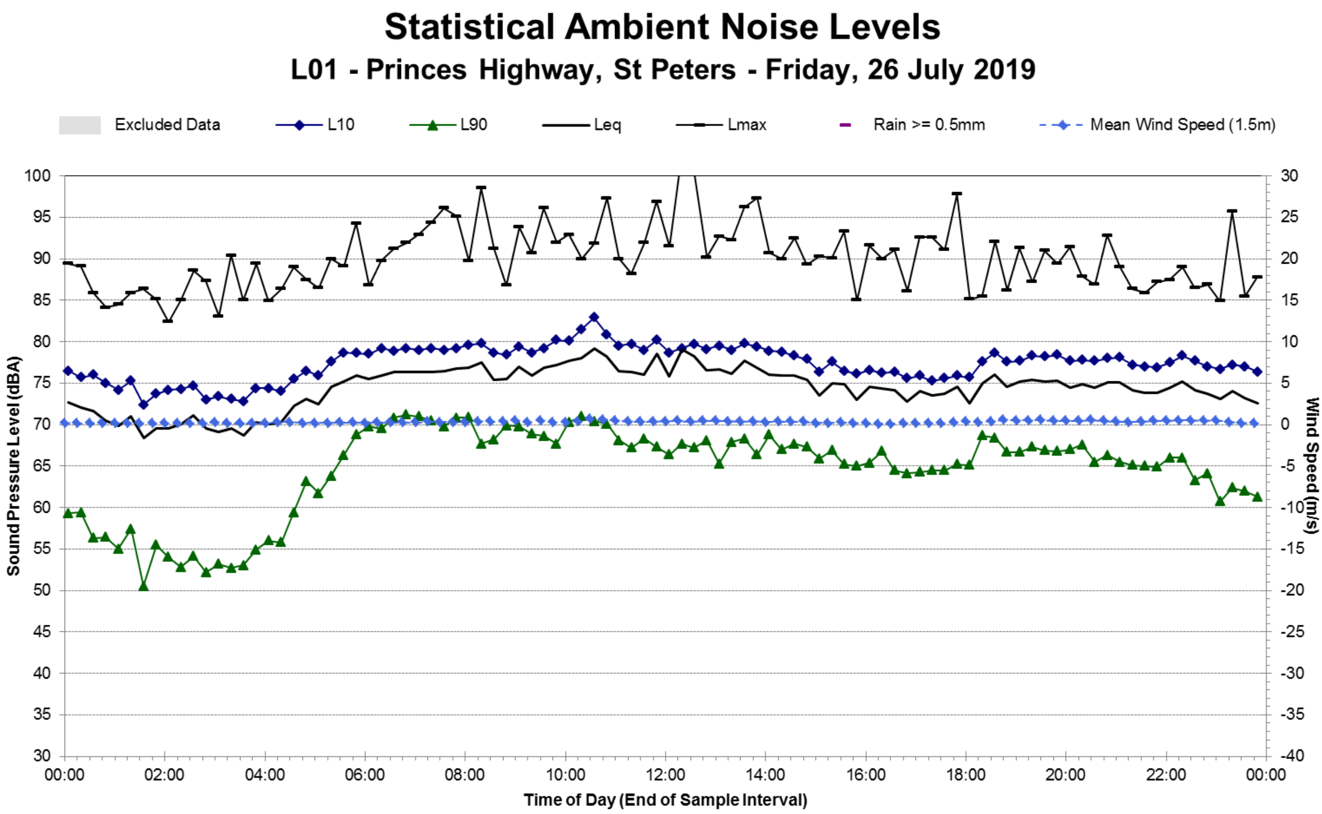
L01 - Princes Highway, St Peters - Wednesday, 24 July 2019



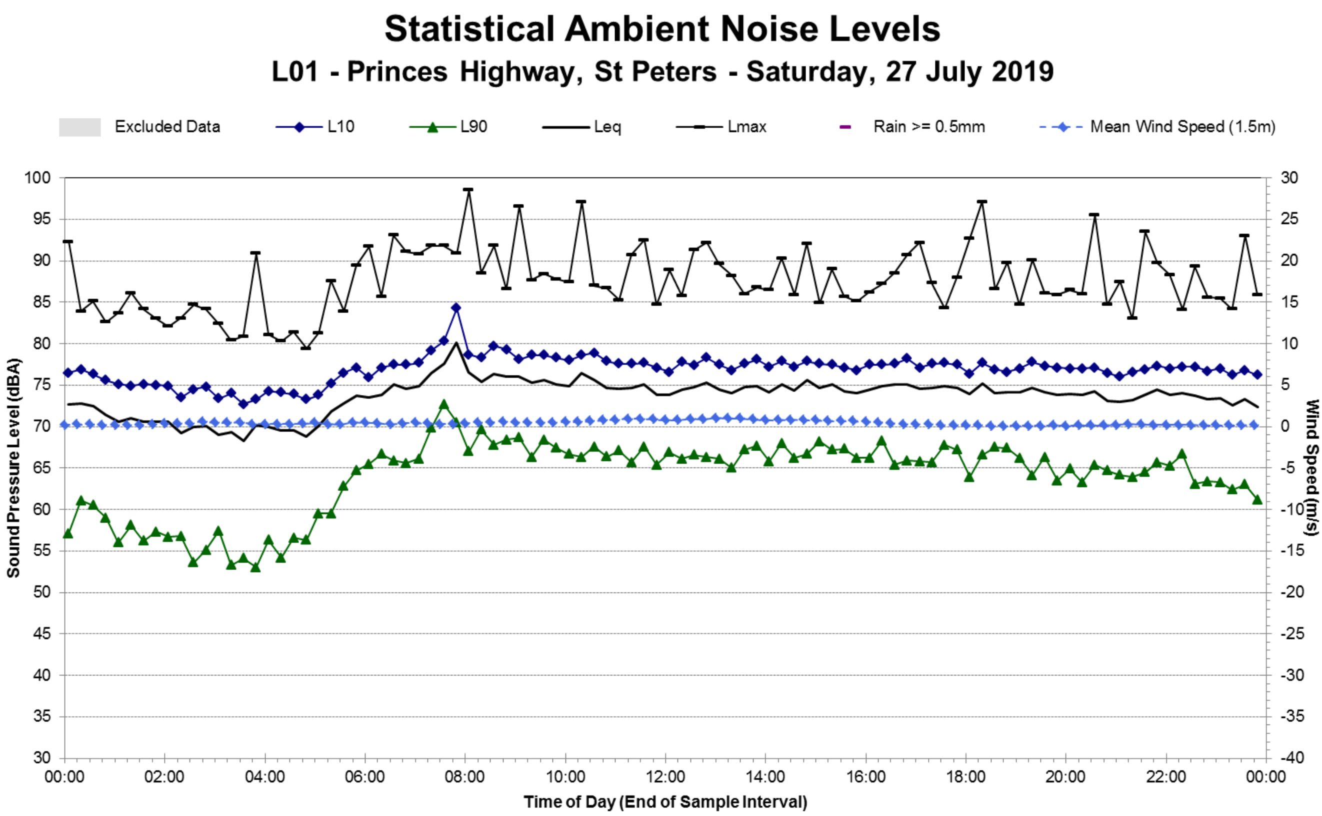
Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Thursday, 25 July 2019

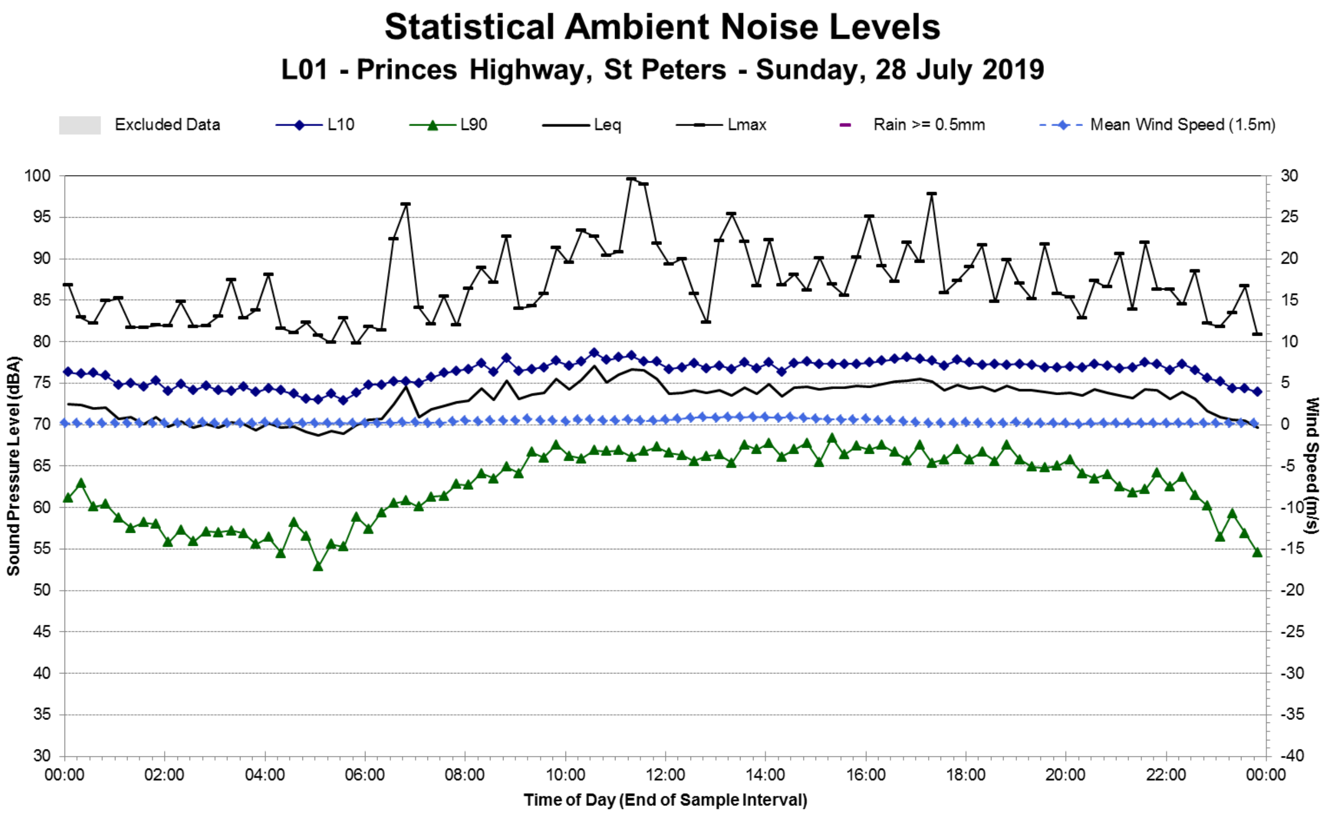




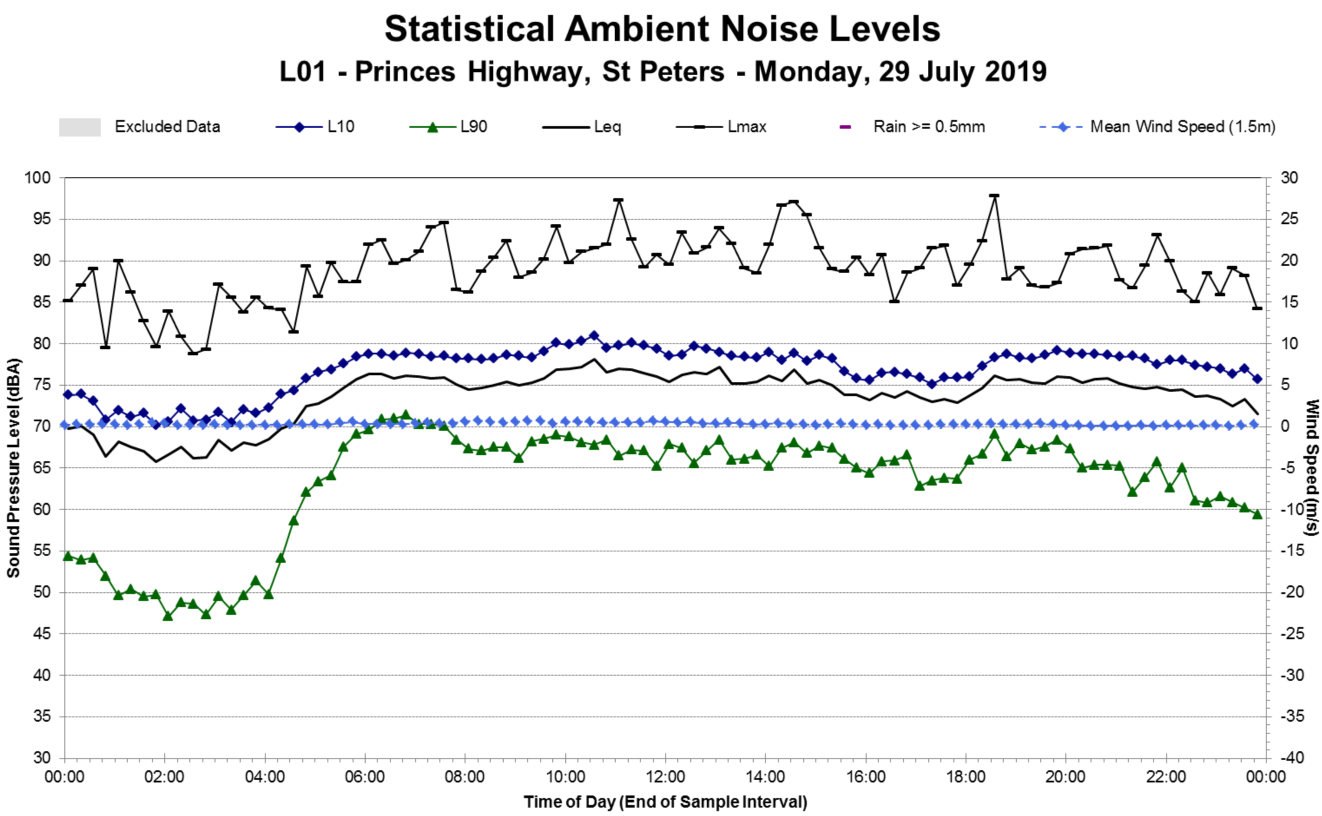
Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Friday, 26 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Saturday, 27 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



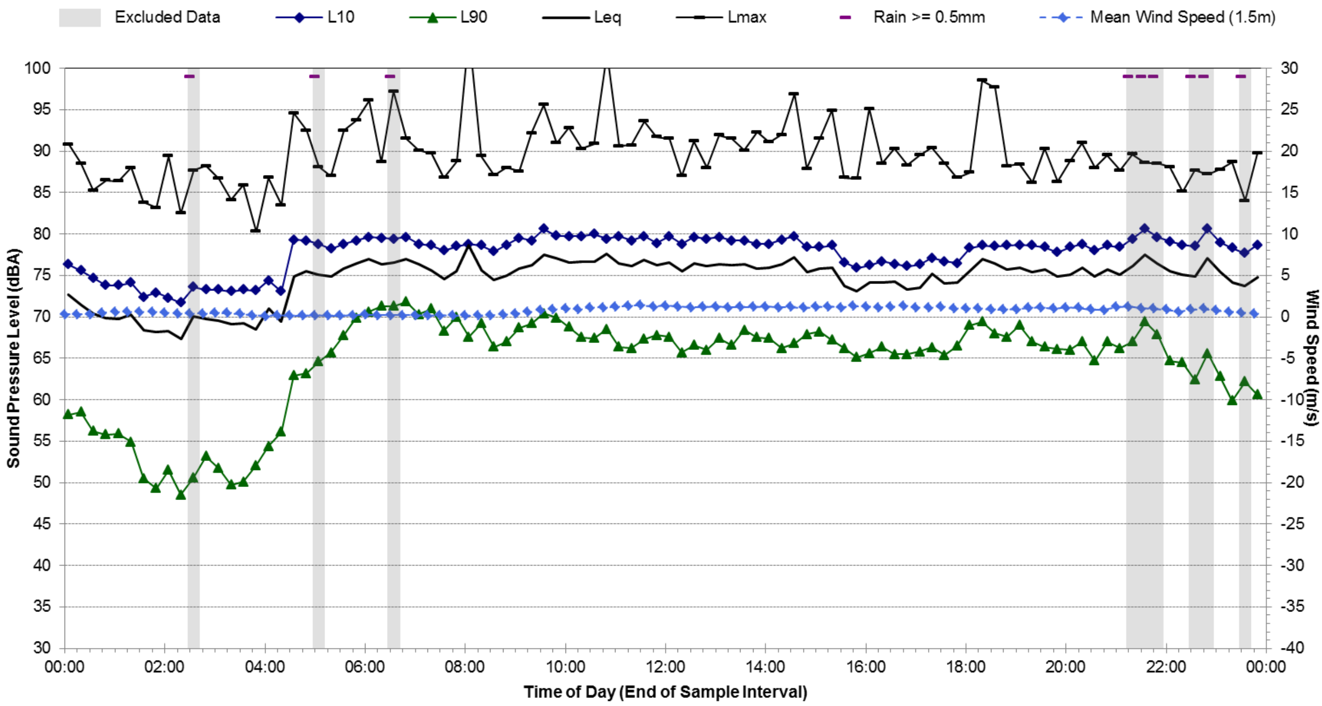
Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Sunday, 28 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Monday, 29 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

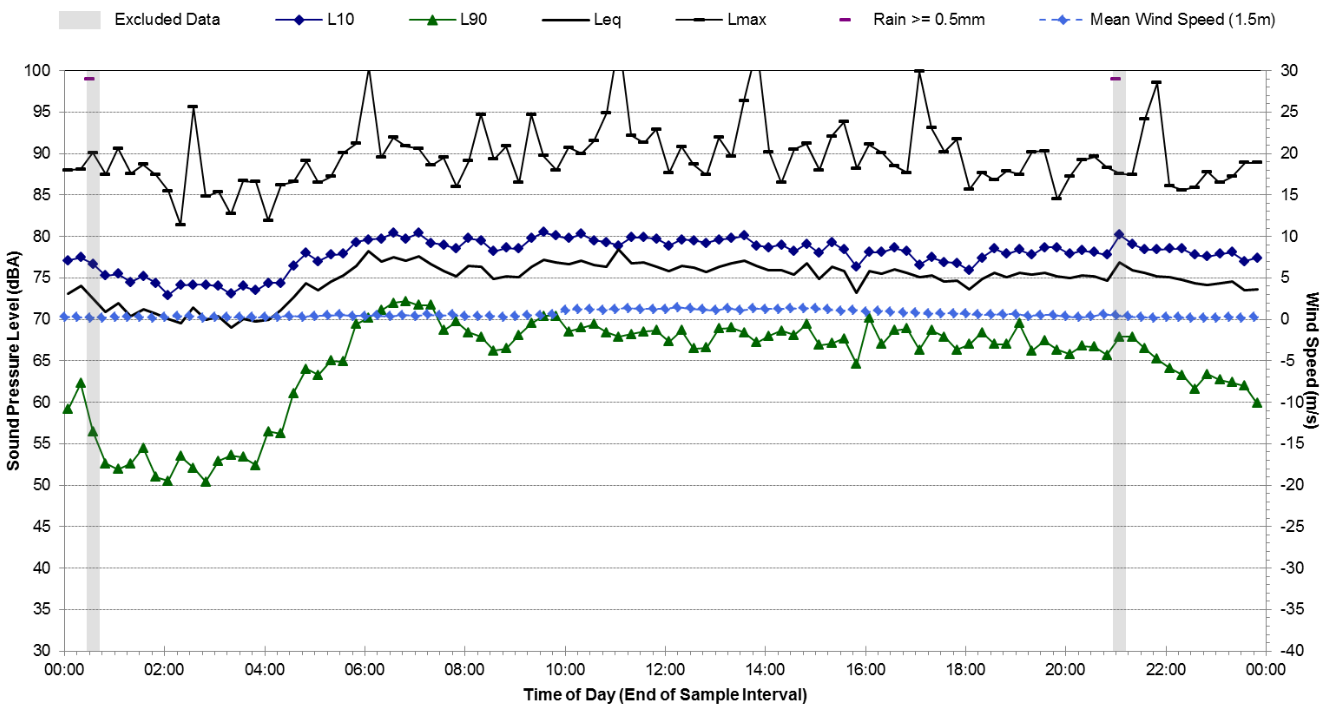
Statistical Ambient Noise Levels

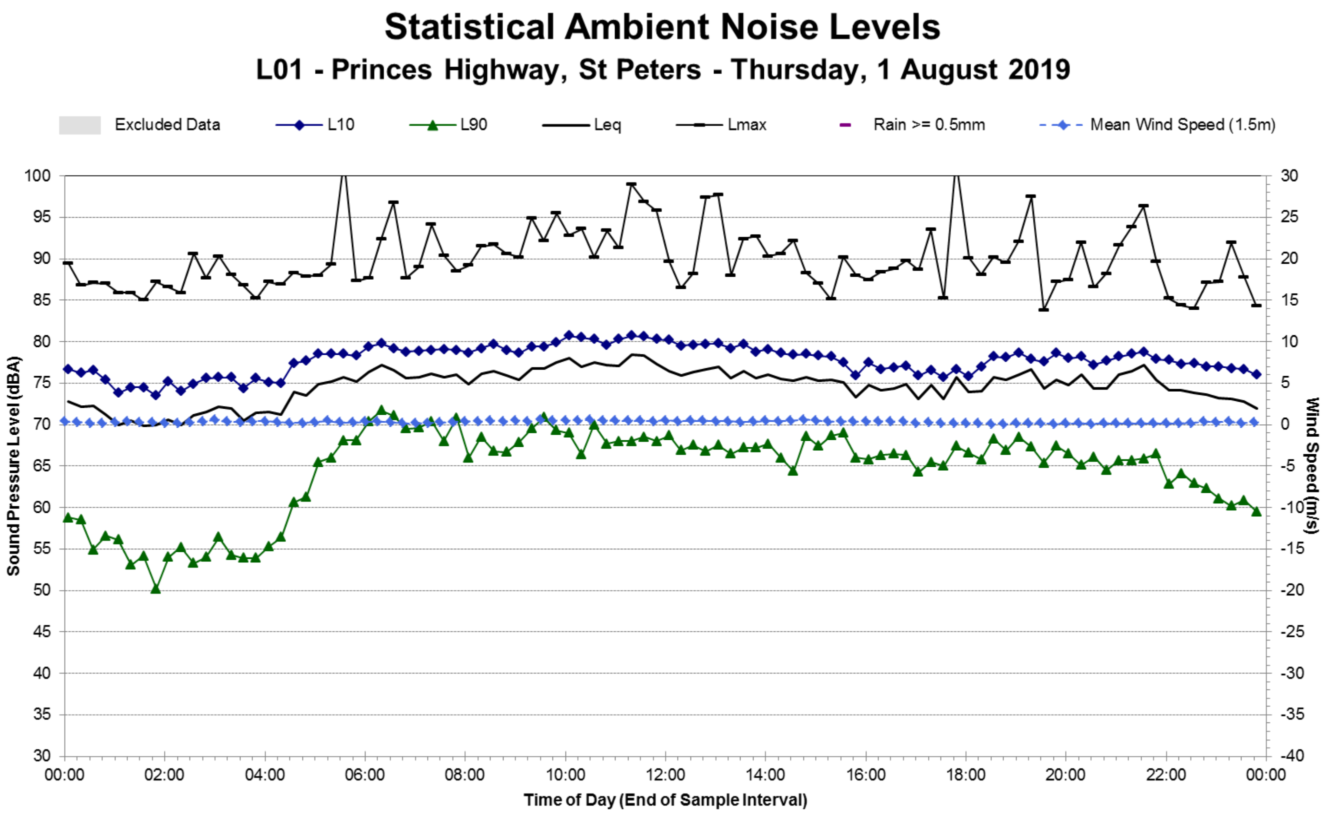
L01 - Princes Highway, St Peters - Tuesday, 30 July 2019

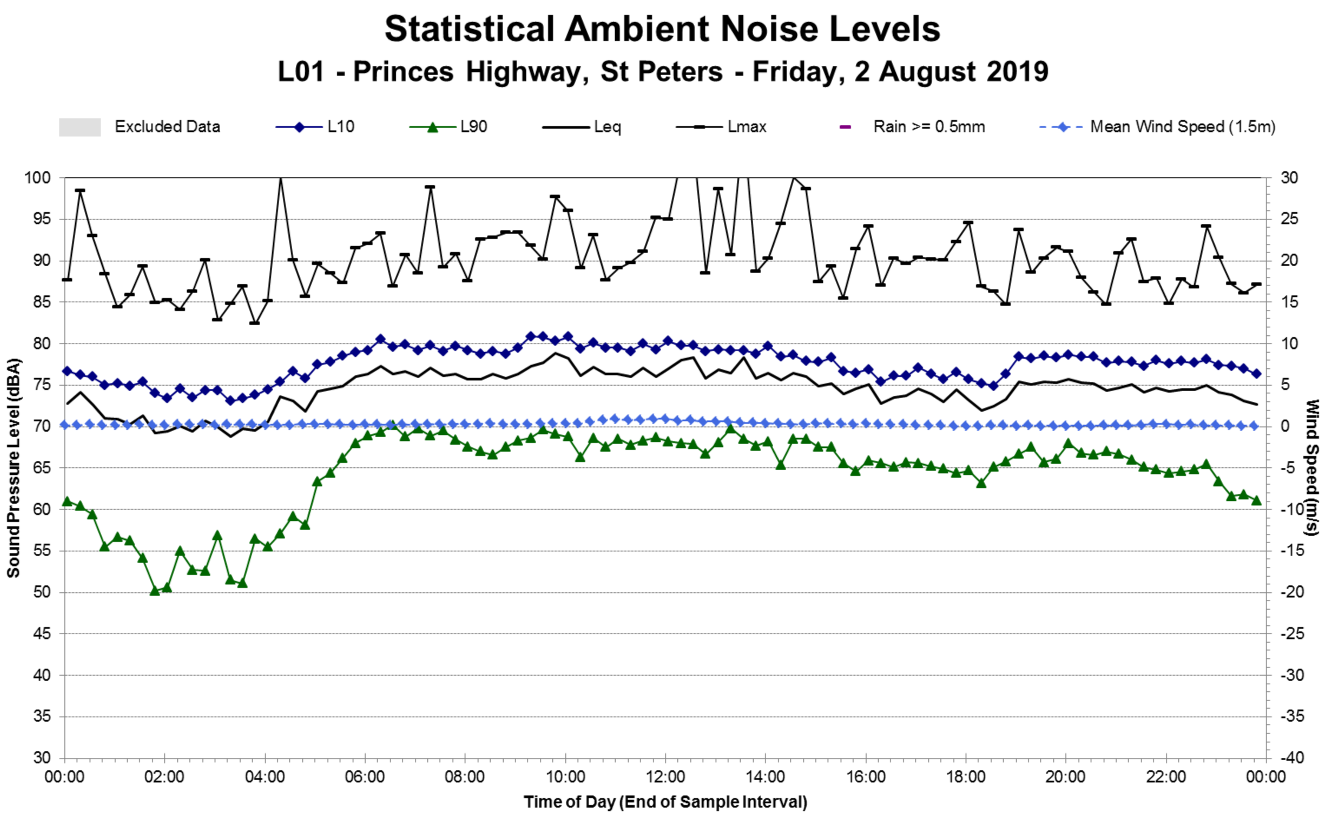


Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Wednesday, 31 July 2019




Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Thursday, 1 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00


Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Friday, 2 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
10:00
12:00
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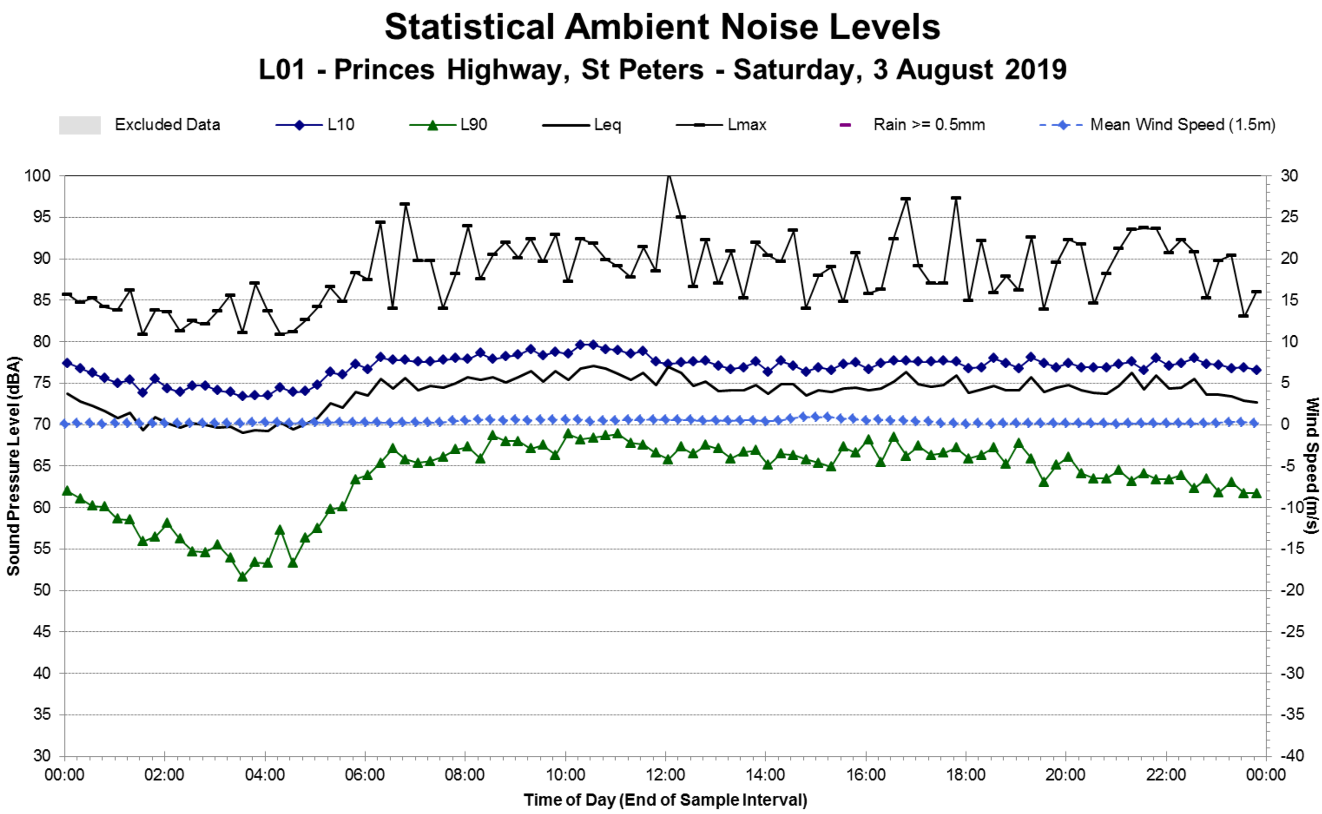
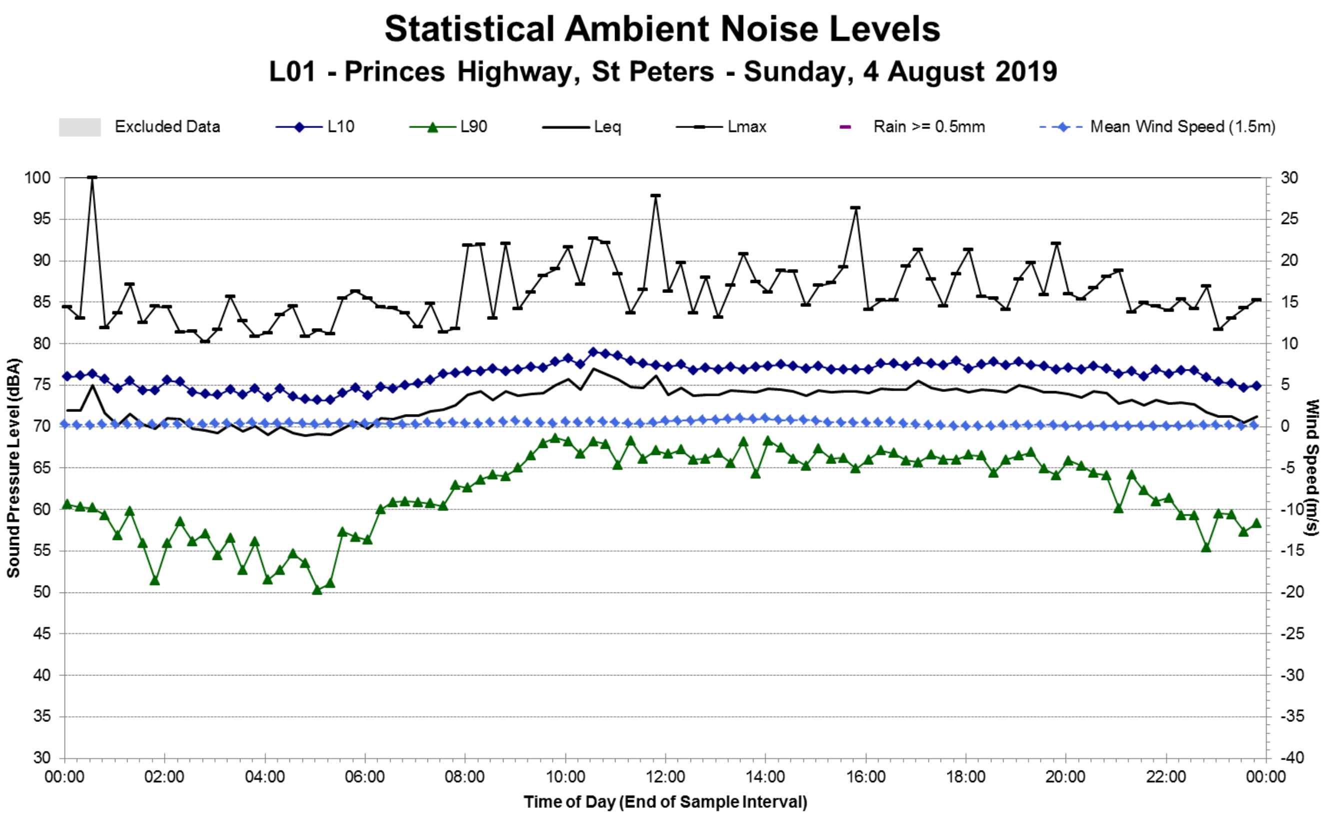
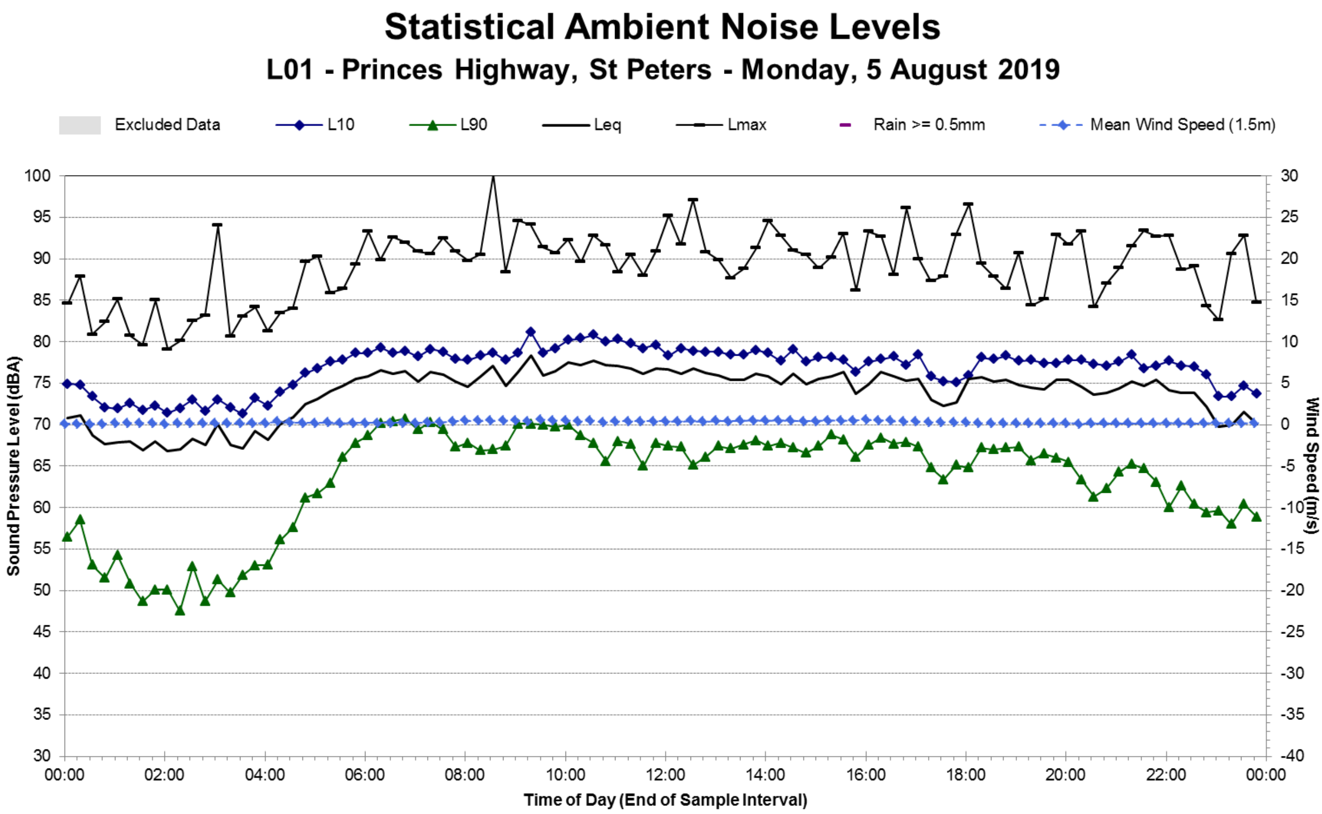
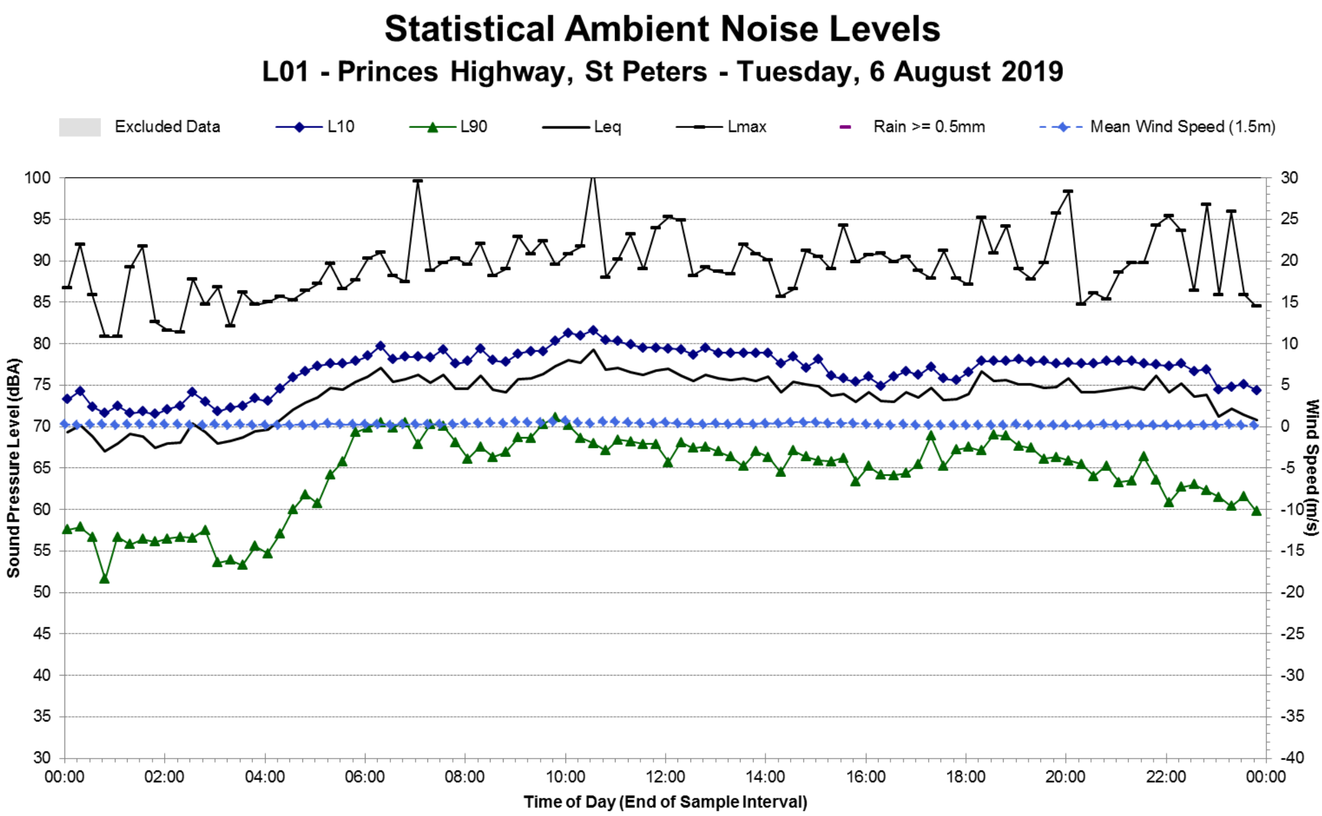
16:00
18:00
20:00
22:00
00:00


Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Saturday, 3 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

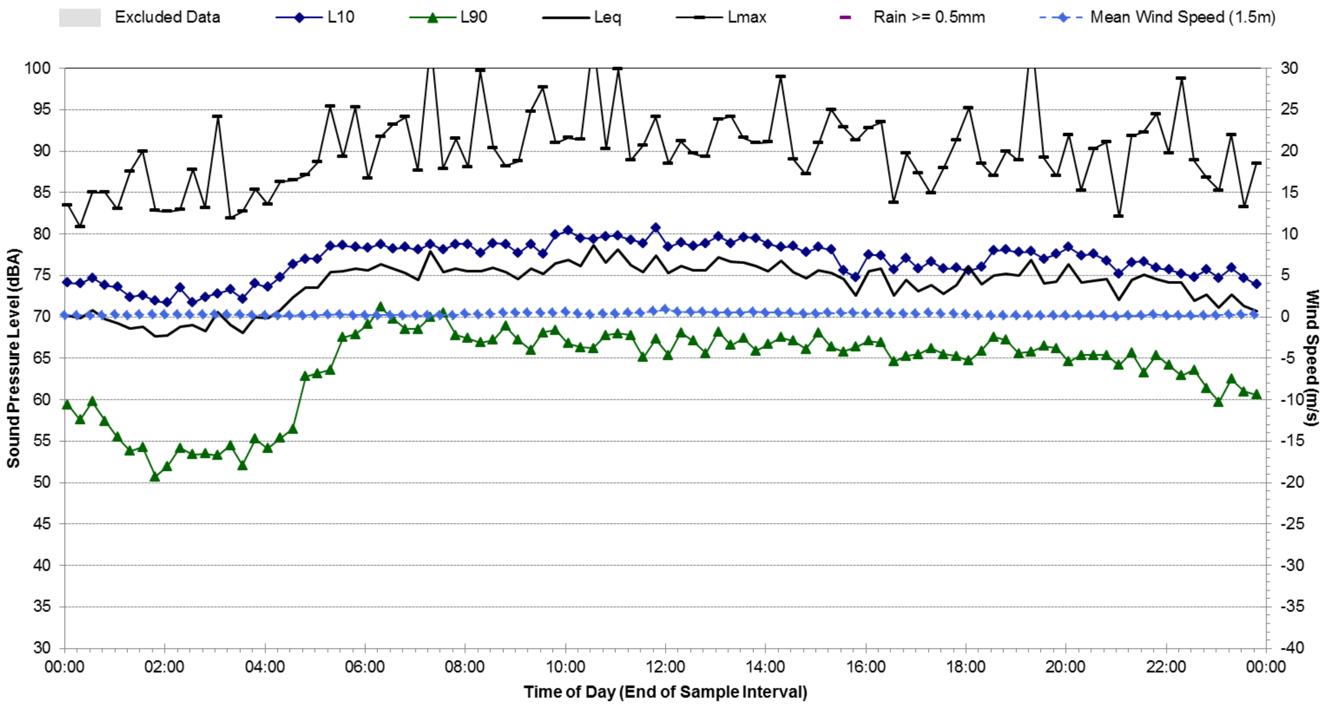

Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Sunday, 4 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Monday, 5 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Tuesday, 6 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

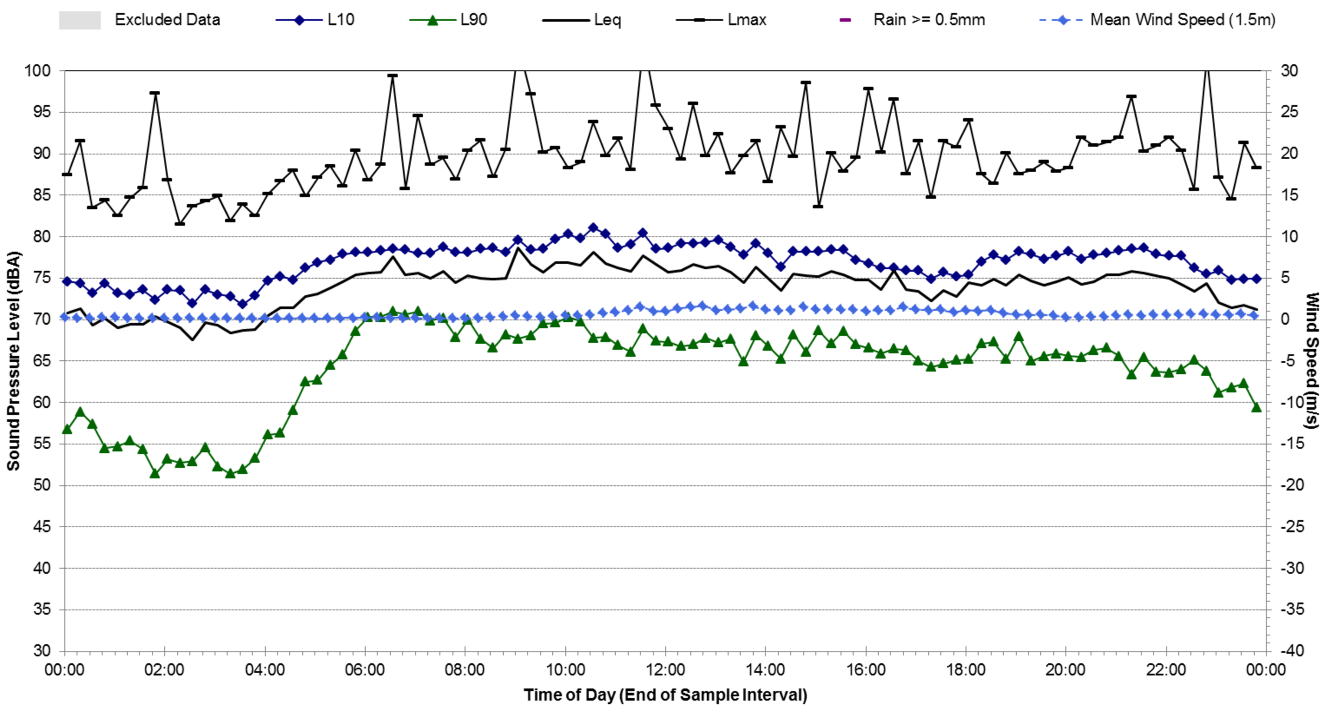
Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Wednesday, 7 August 2019



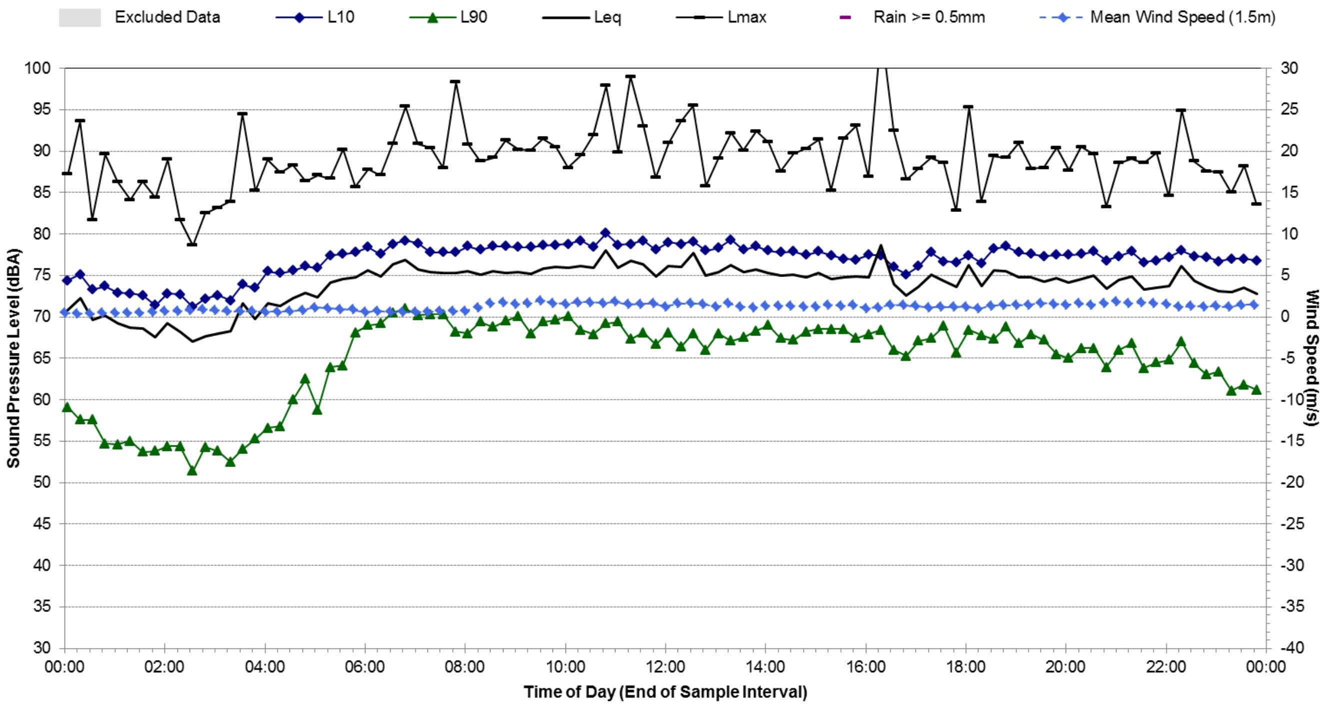
Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Thursday, 8 August 2019



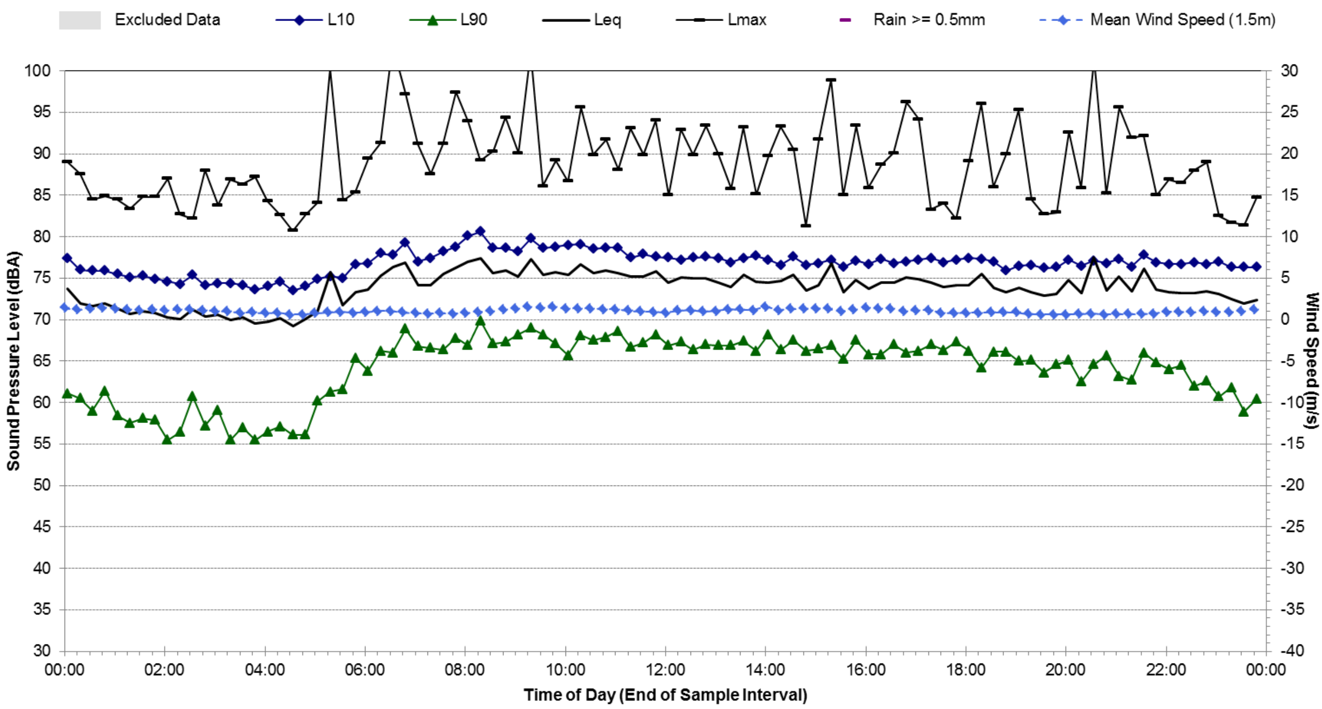
Statistical Ambient Noise Levels

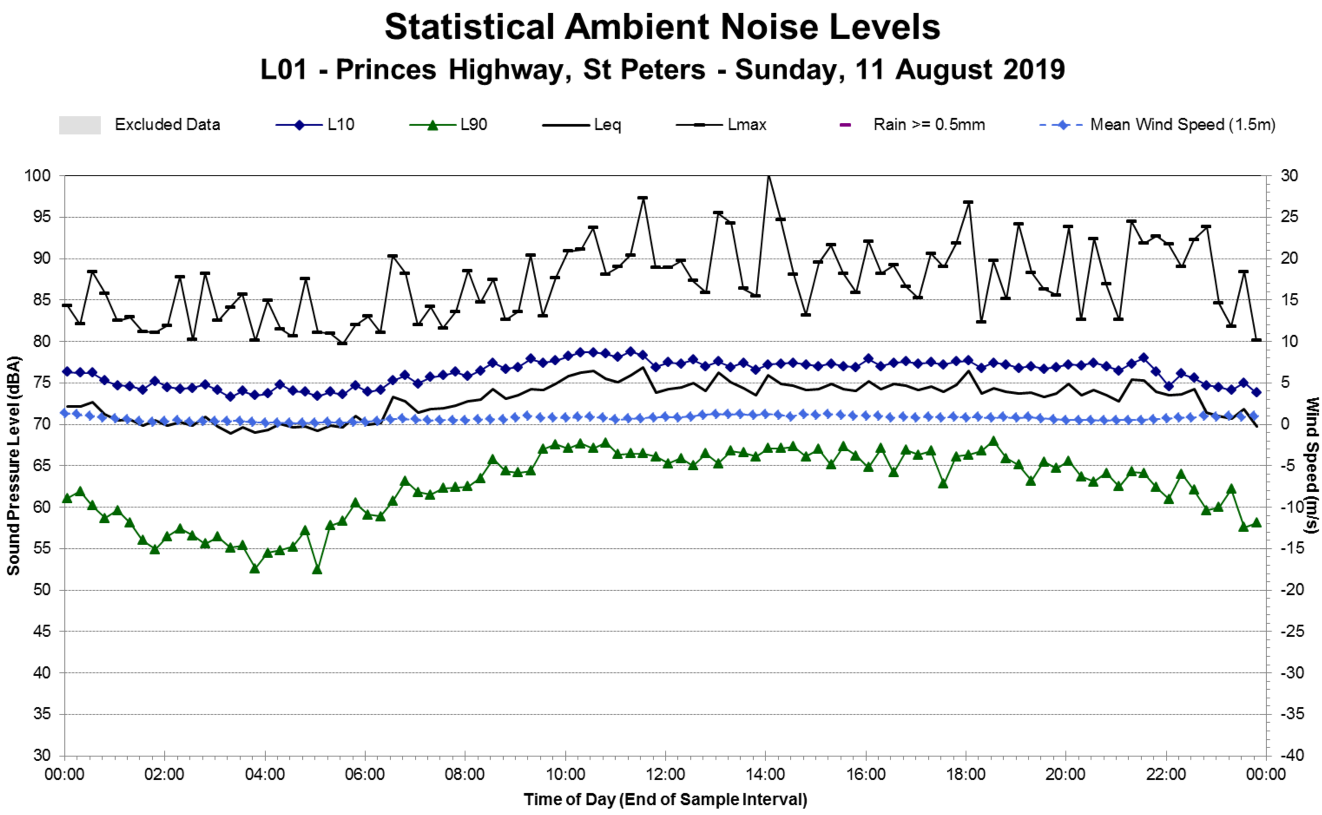
L01 - Princes Highway, St Peters - Friday, 9 August 2019



Statistical Ambient Noise Levels

L01 - Princes Highway, St Peters - Saturday, 10 August 2019





Statistical Ambient Noise Levels
L01 - Princes Highway, St Peters - Sunday, 11 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
00:00
02:00
04:00
06:00
08:00
10:00
12:00
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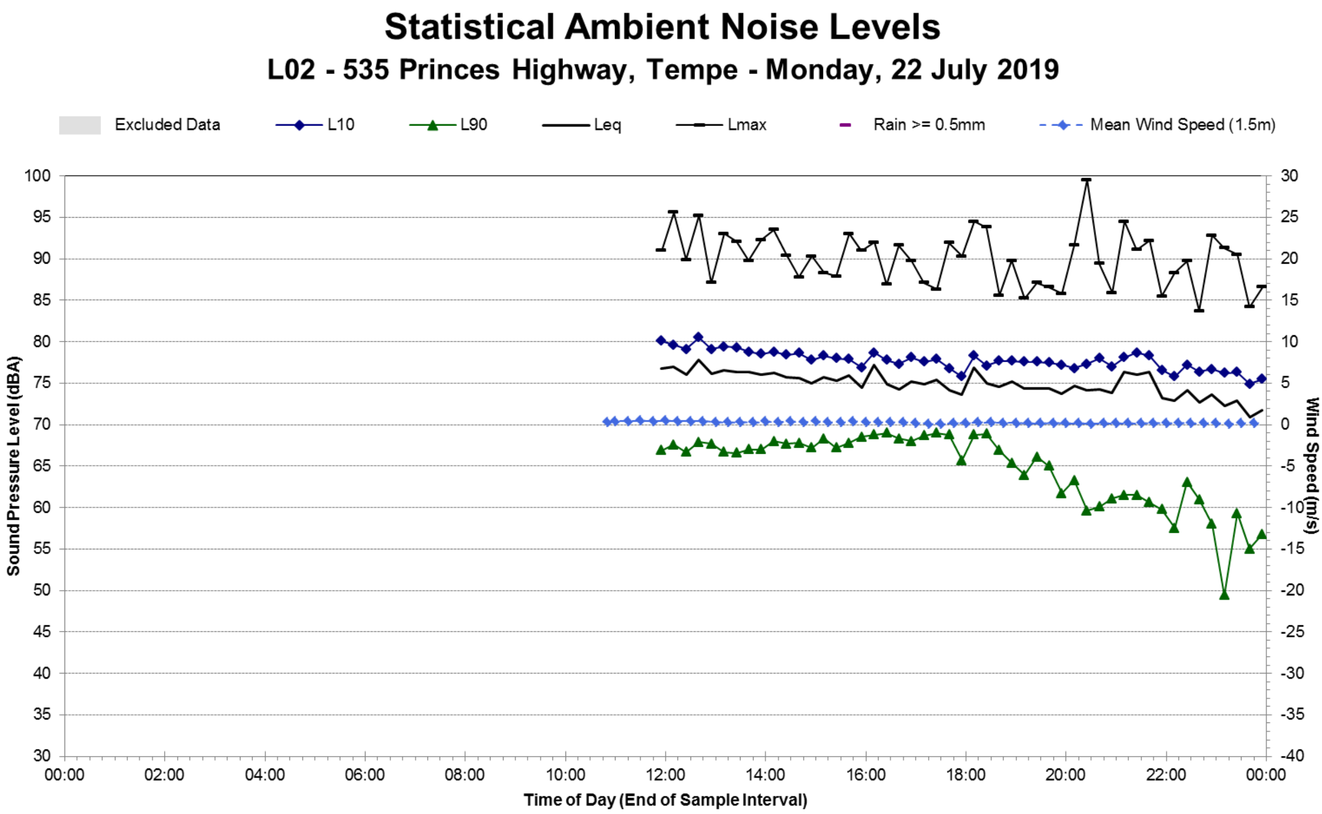
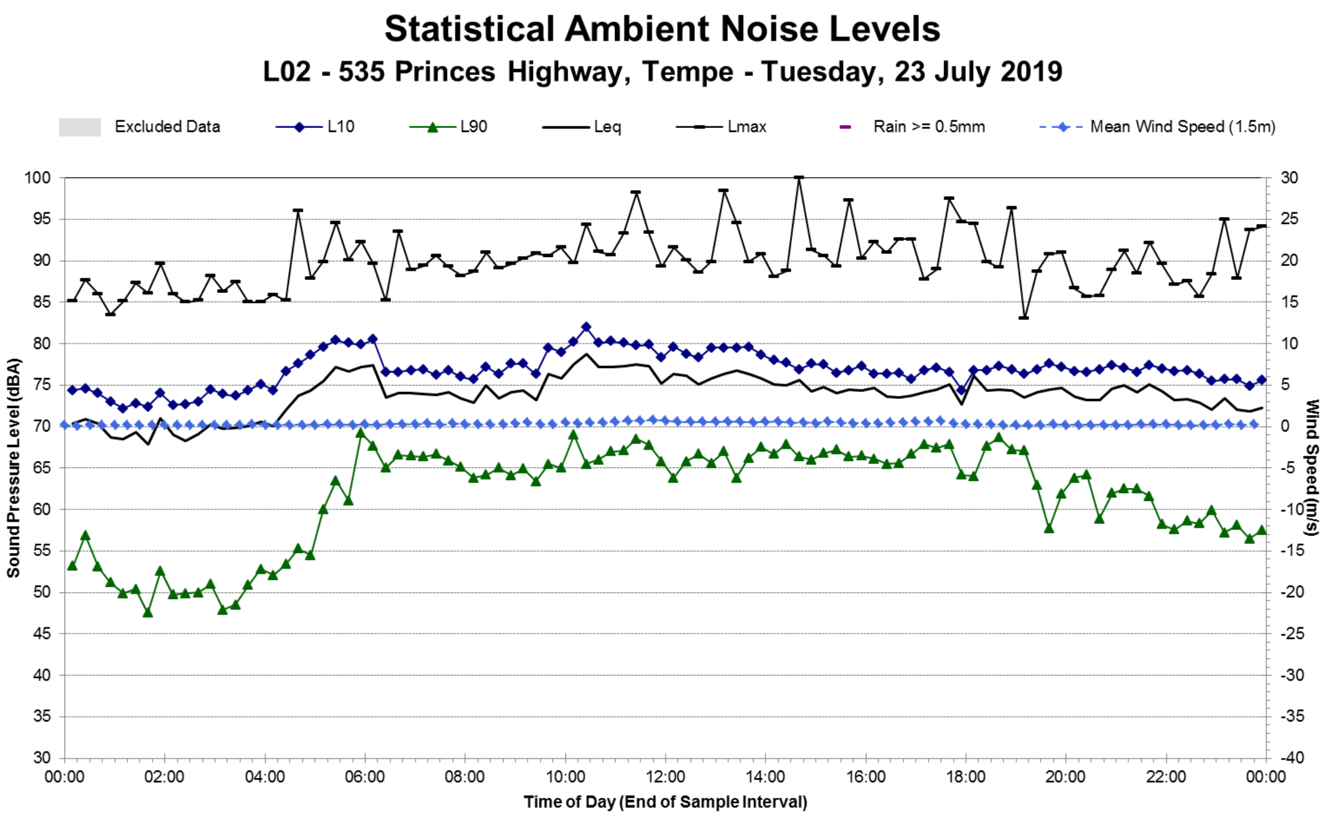
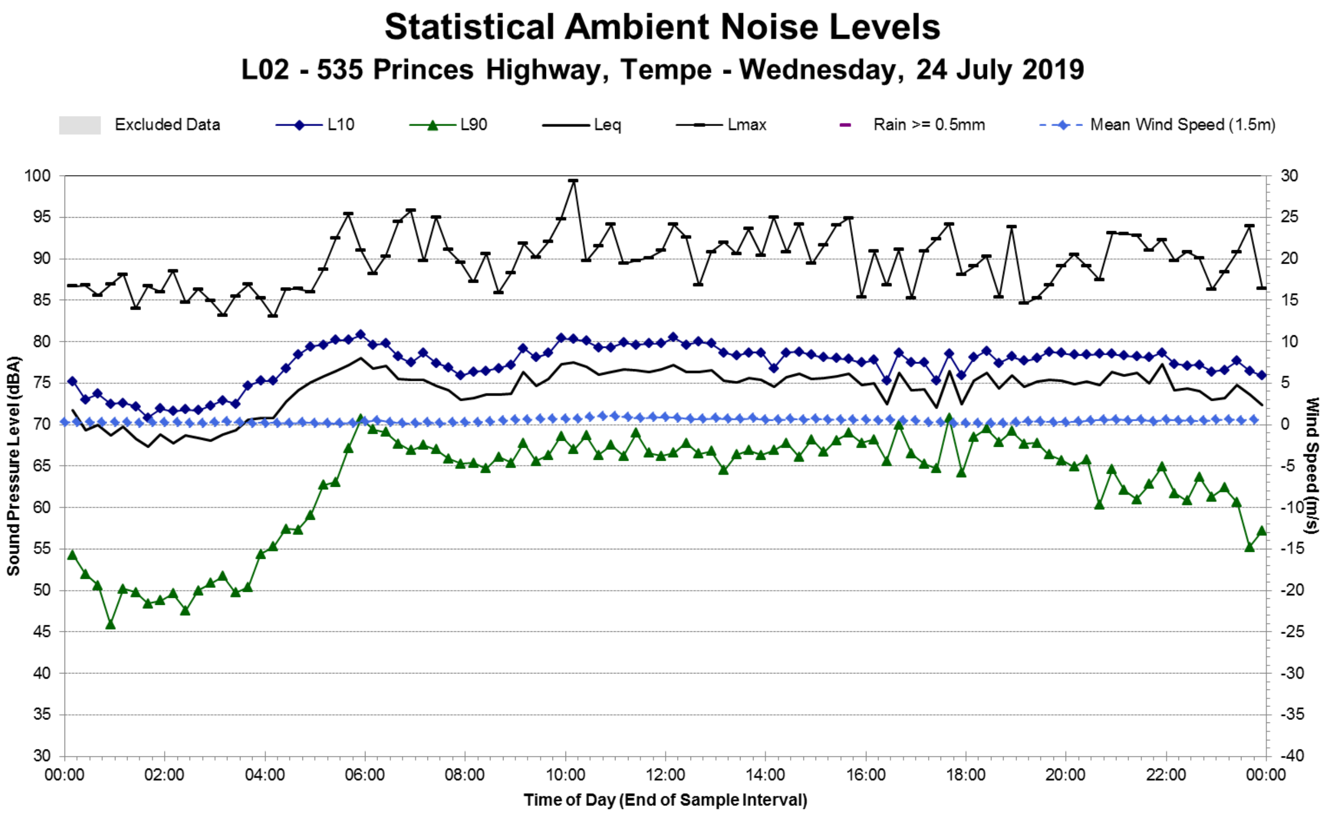
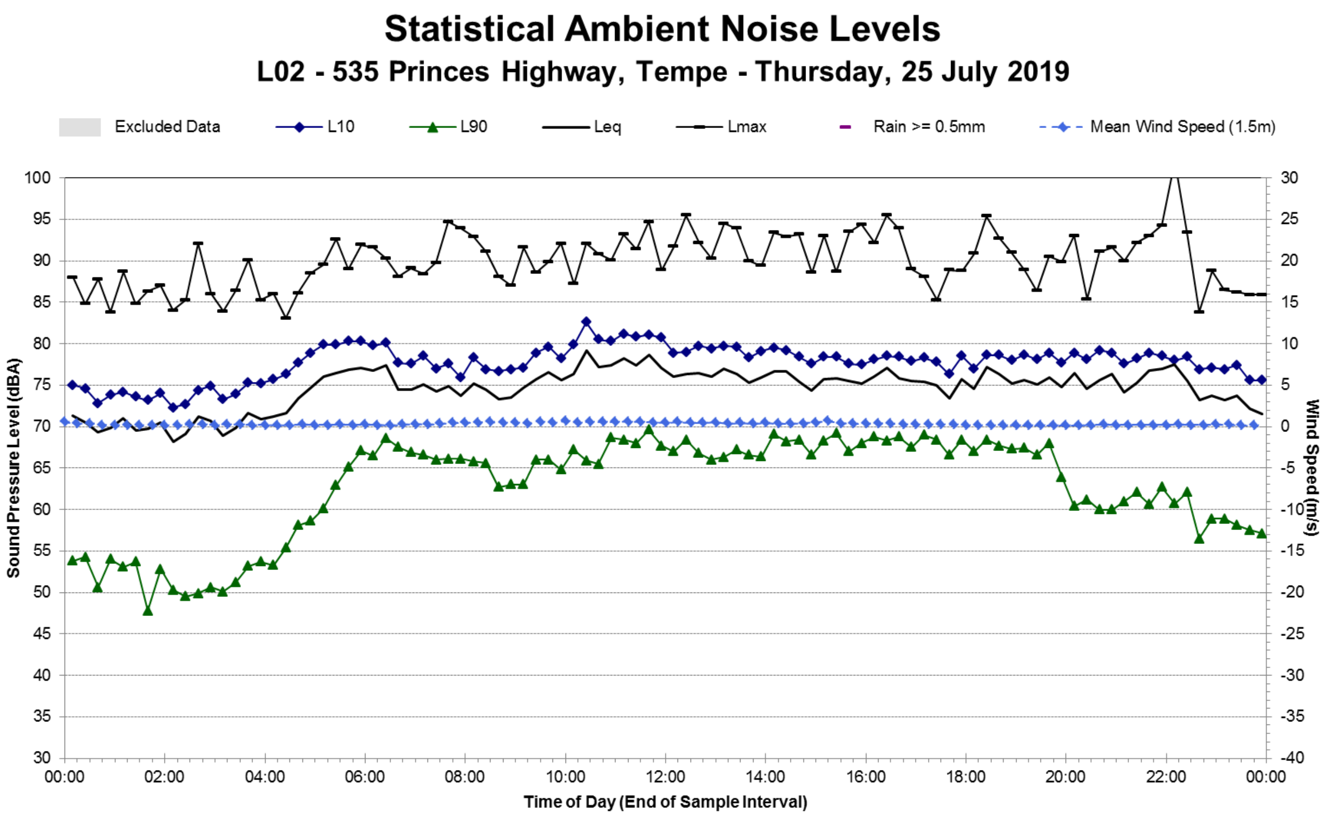
20:00
22:00
00:00


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Monday, 22 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

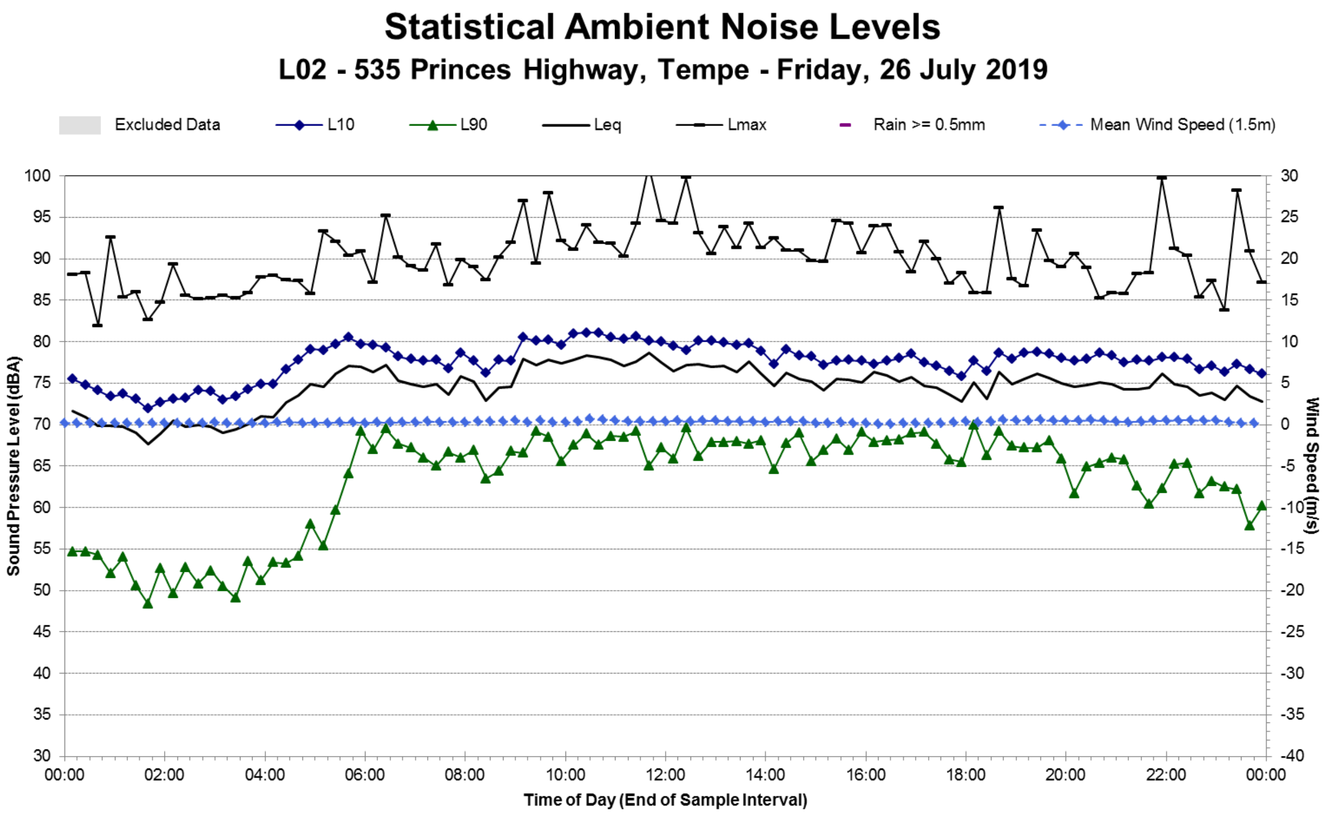

Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Tuesday, 23 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

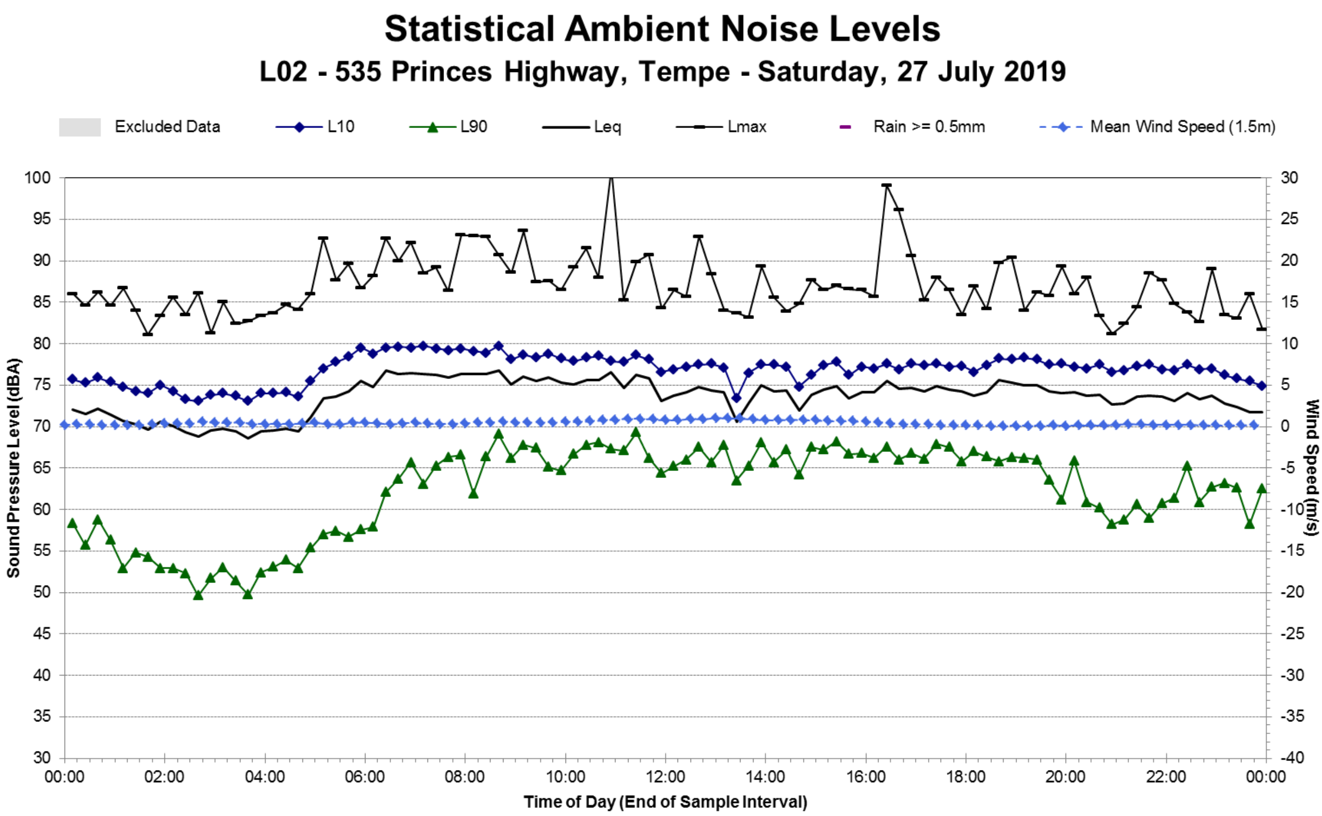


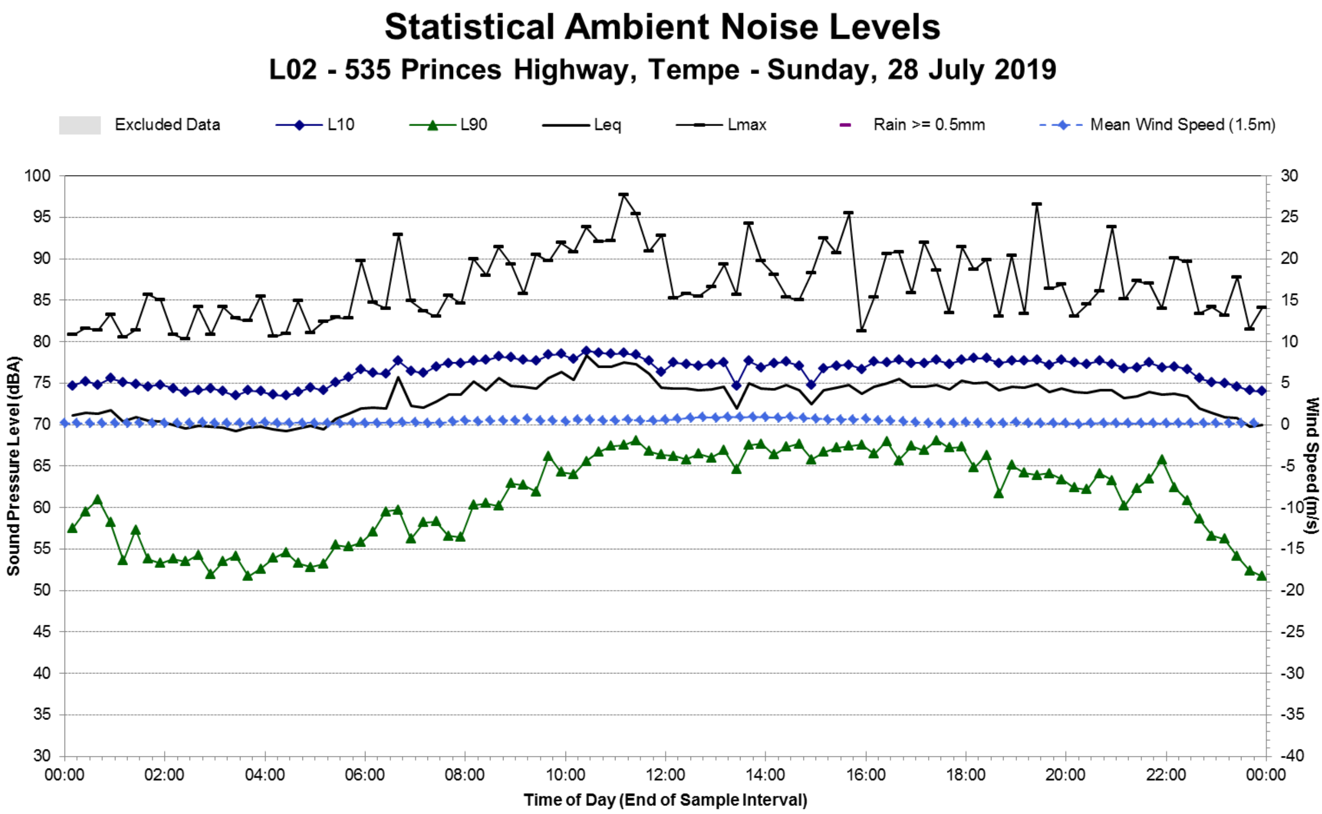
Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Wednesday, 24 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

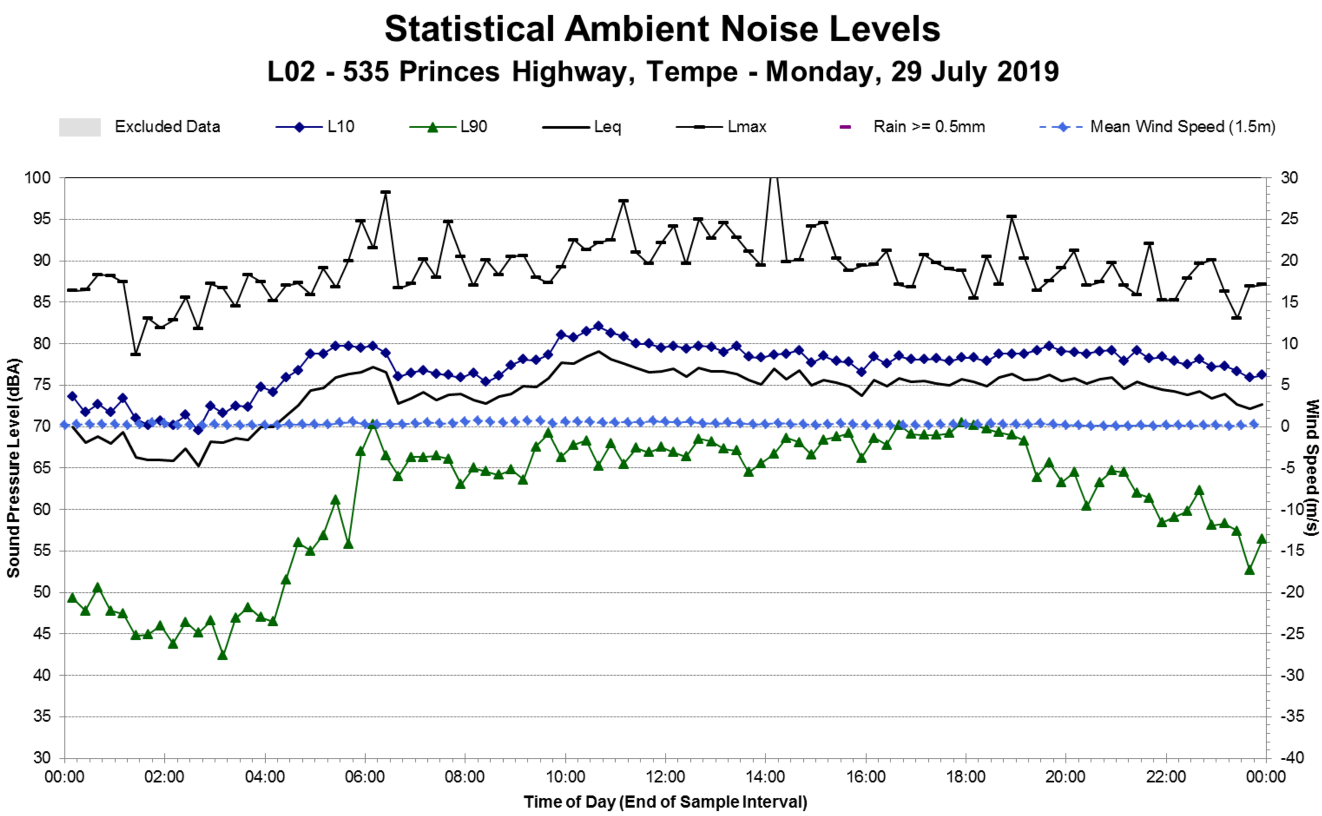


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Friday, 26 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

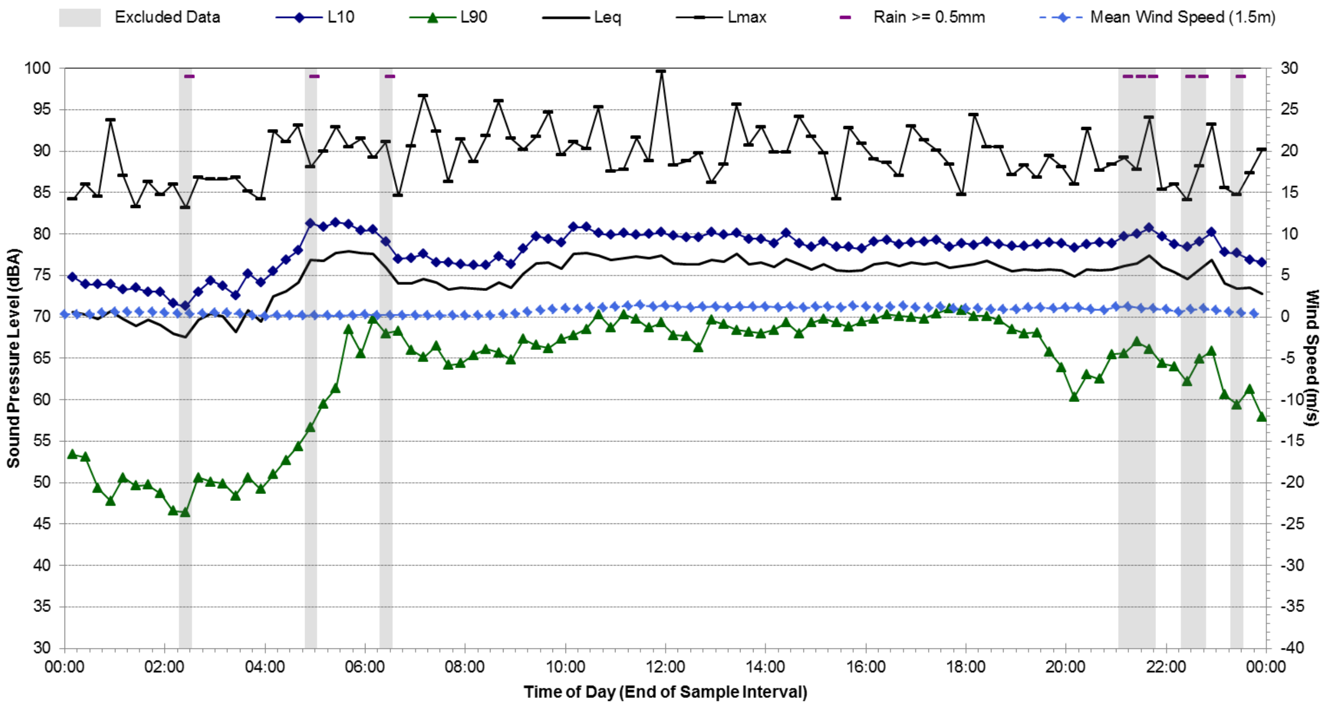

Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Saturday, 27 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Sunday, 28 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Monday, 29 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

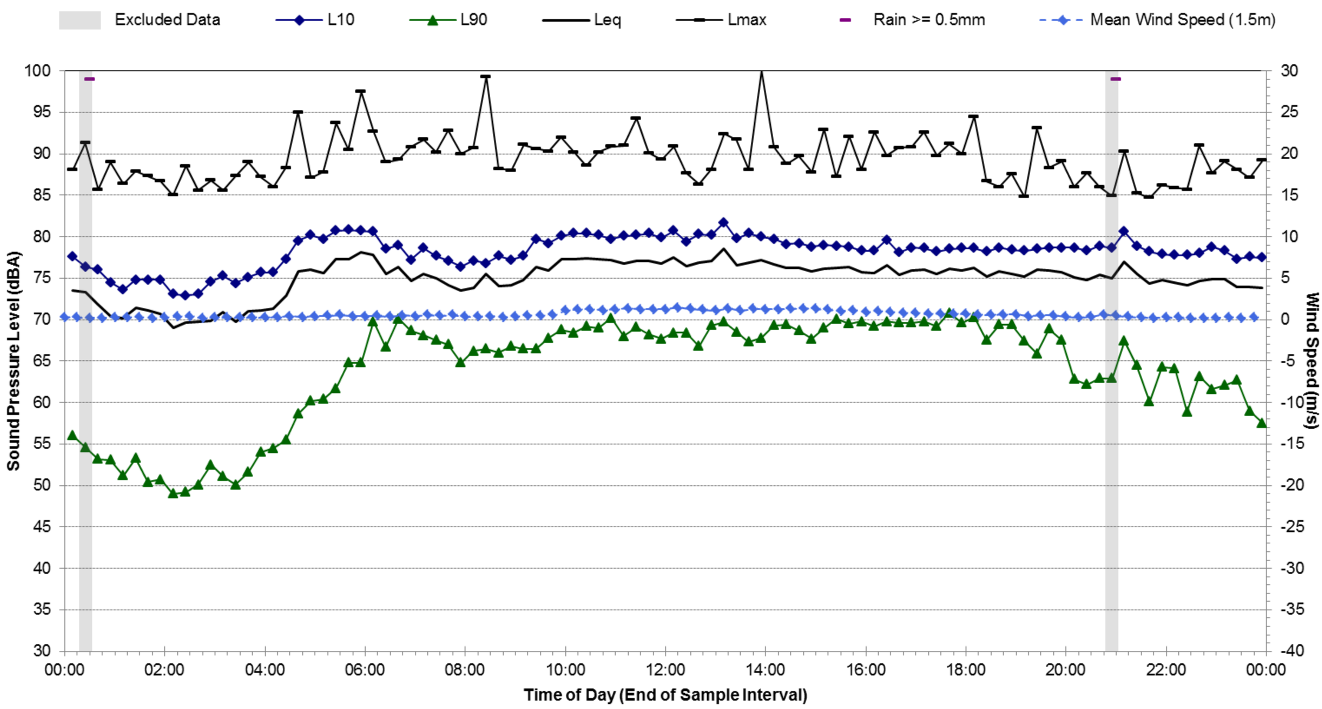
Statistical Ambient Noise Levels

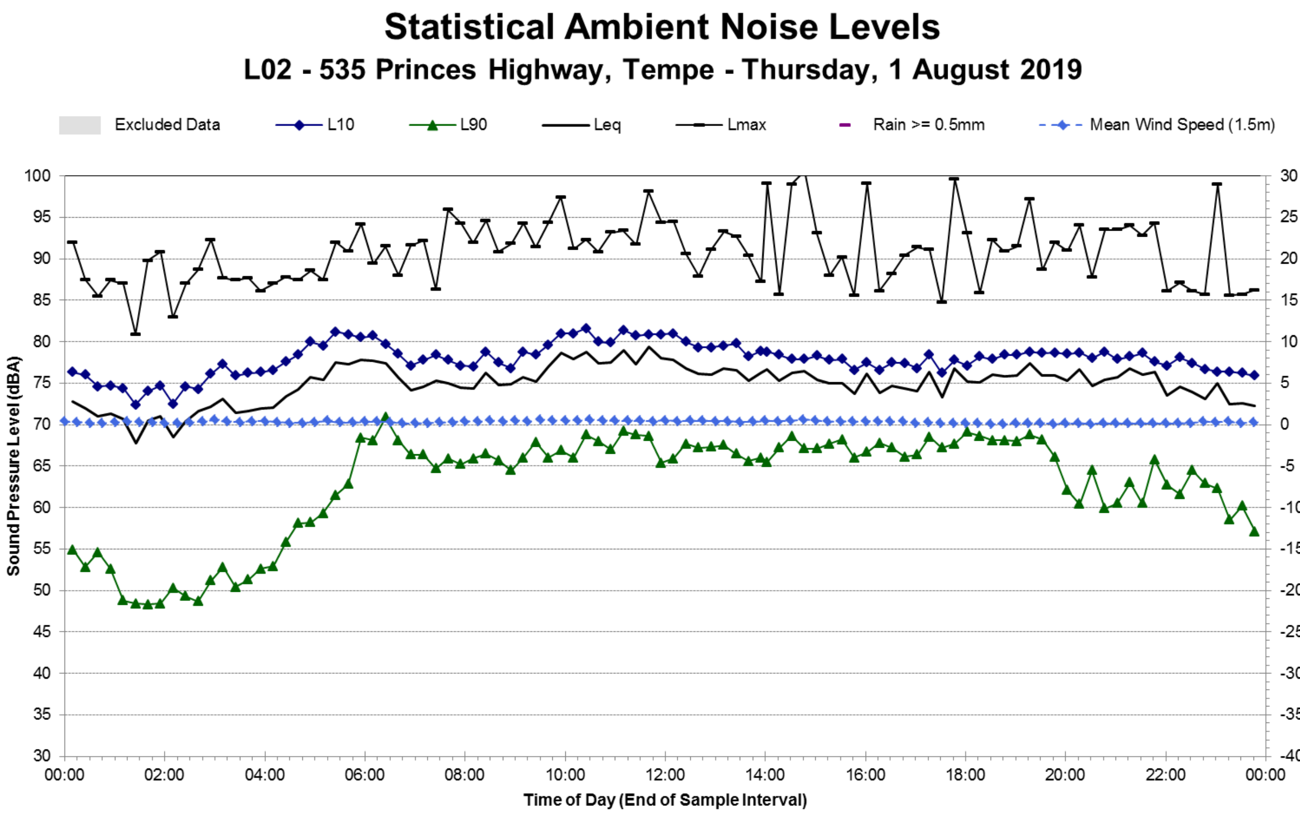
L02 - 535 Princes Highway, Tempe - Tuesday, 30 July 2019



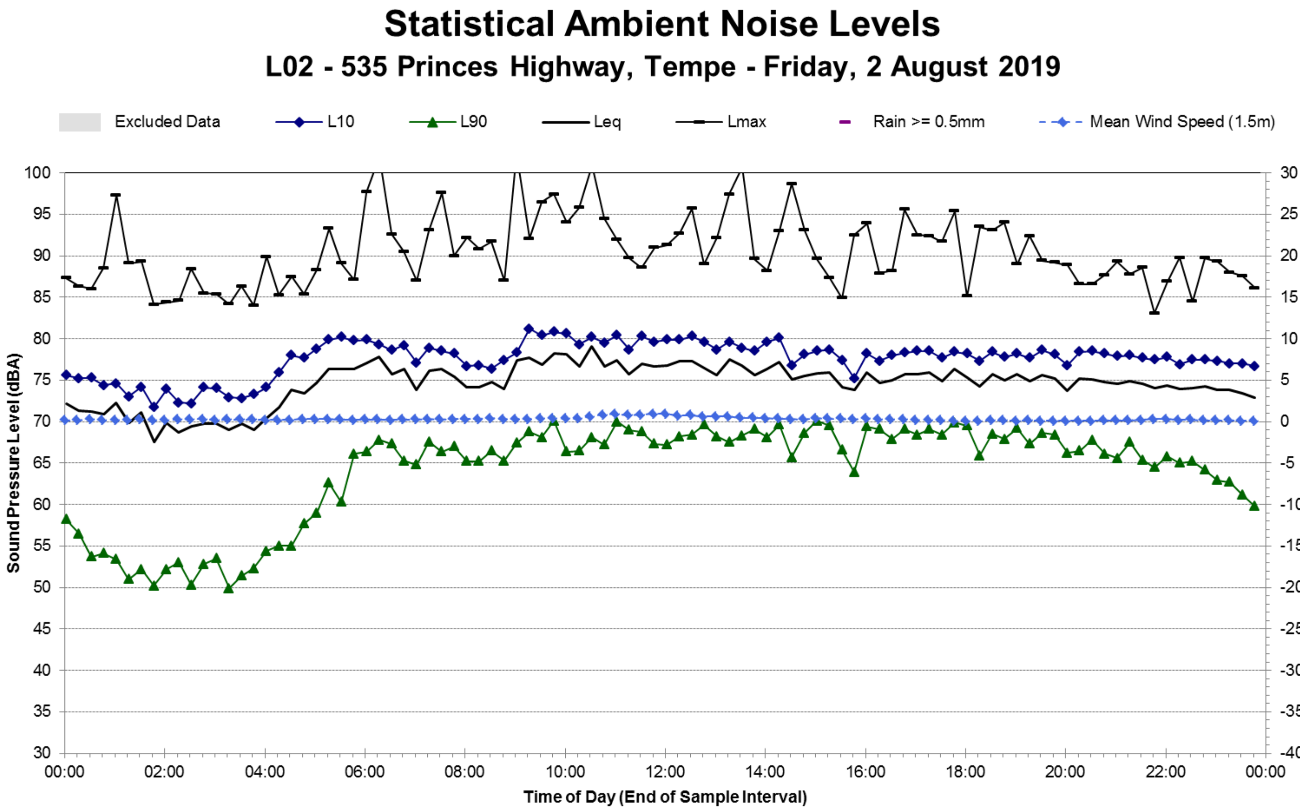
Statistical Ambient Noise Levels

L02 - 535 Princes Highway, Tempe - Wednesday, 31 July 2019

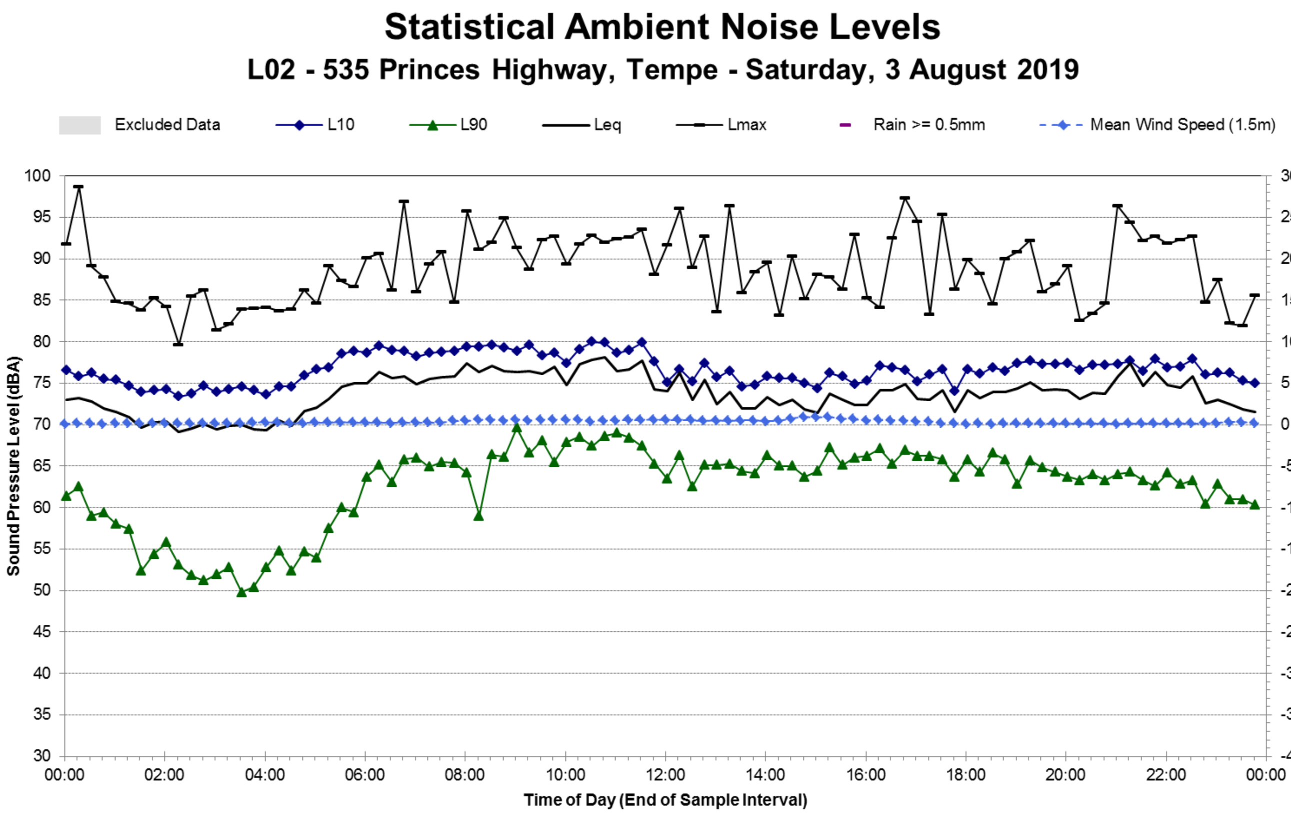




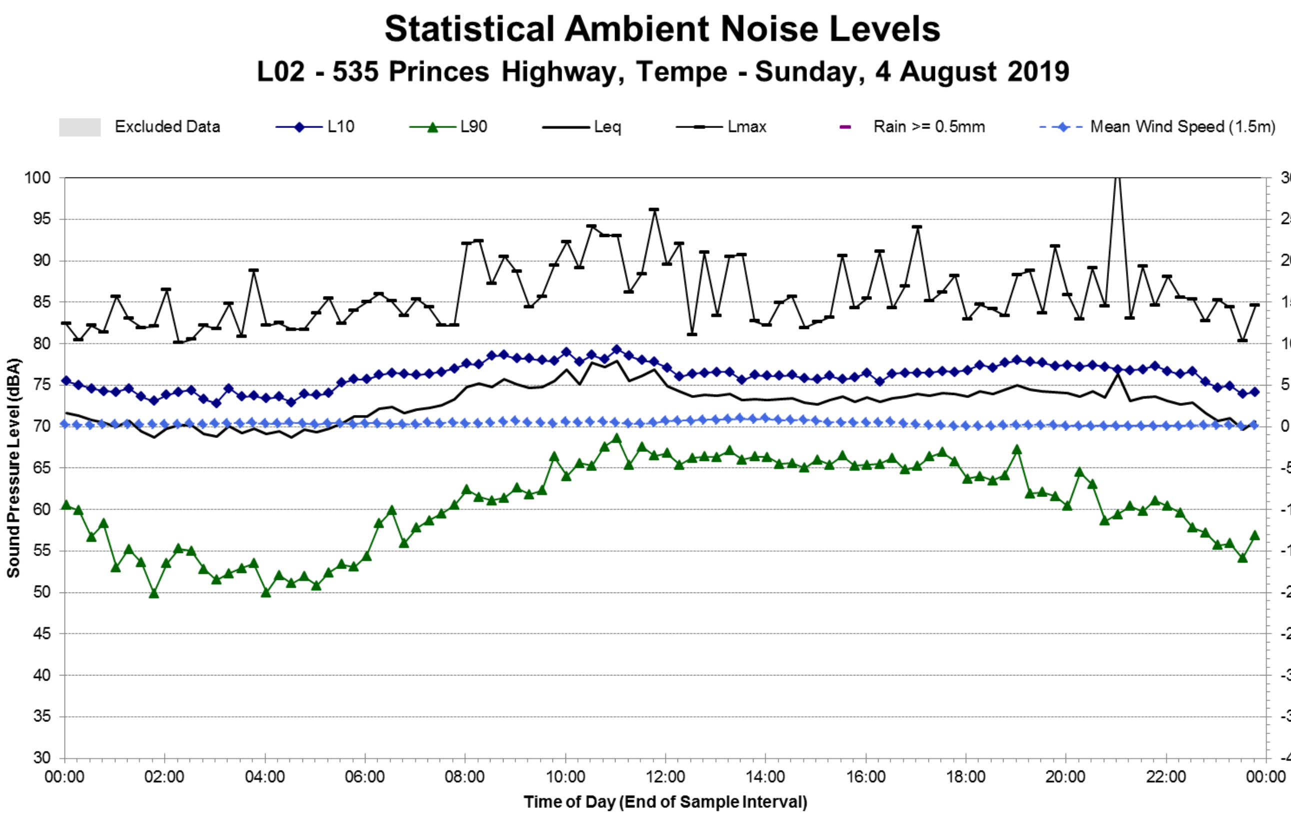
Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Thursday, 1 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



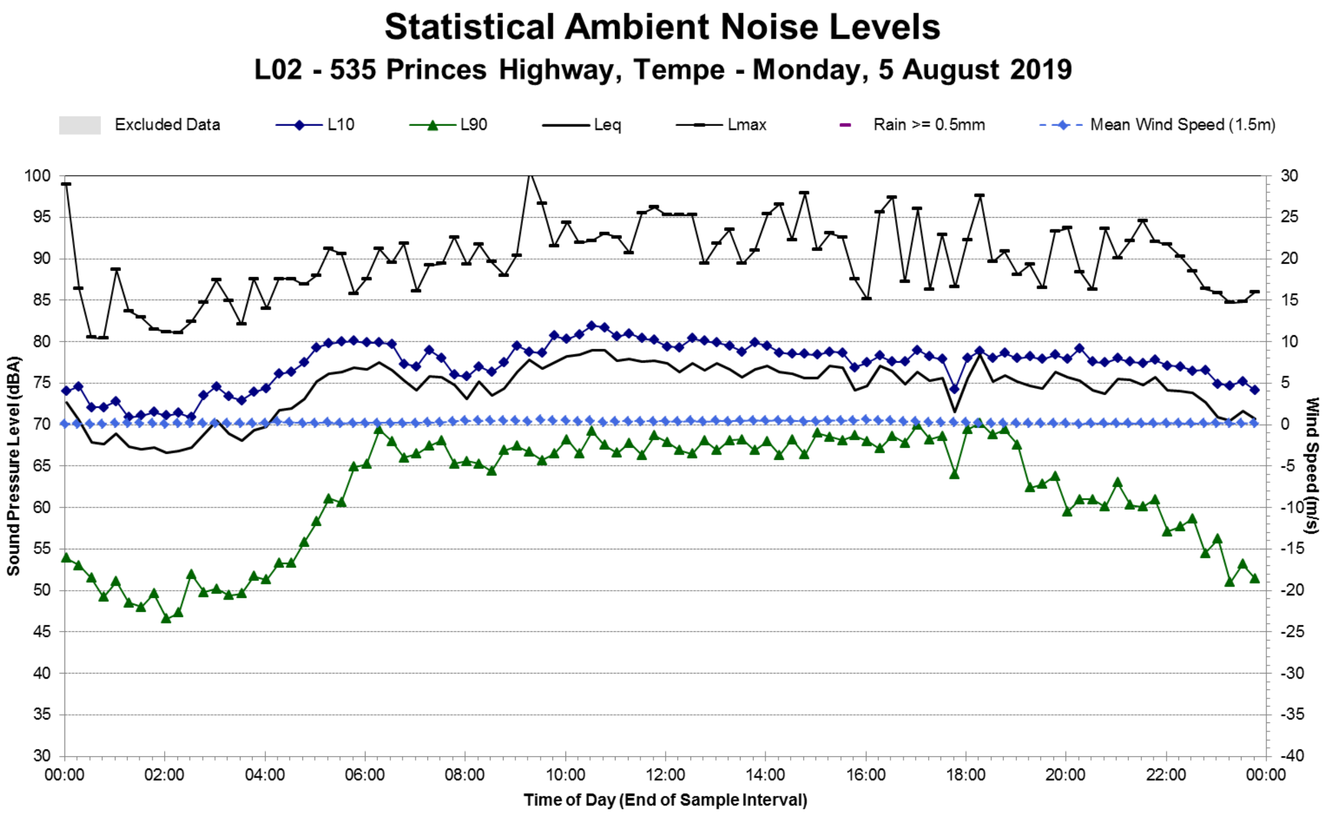
Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Friday, 2 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

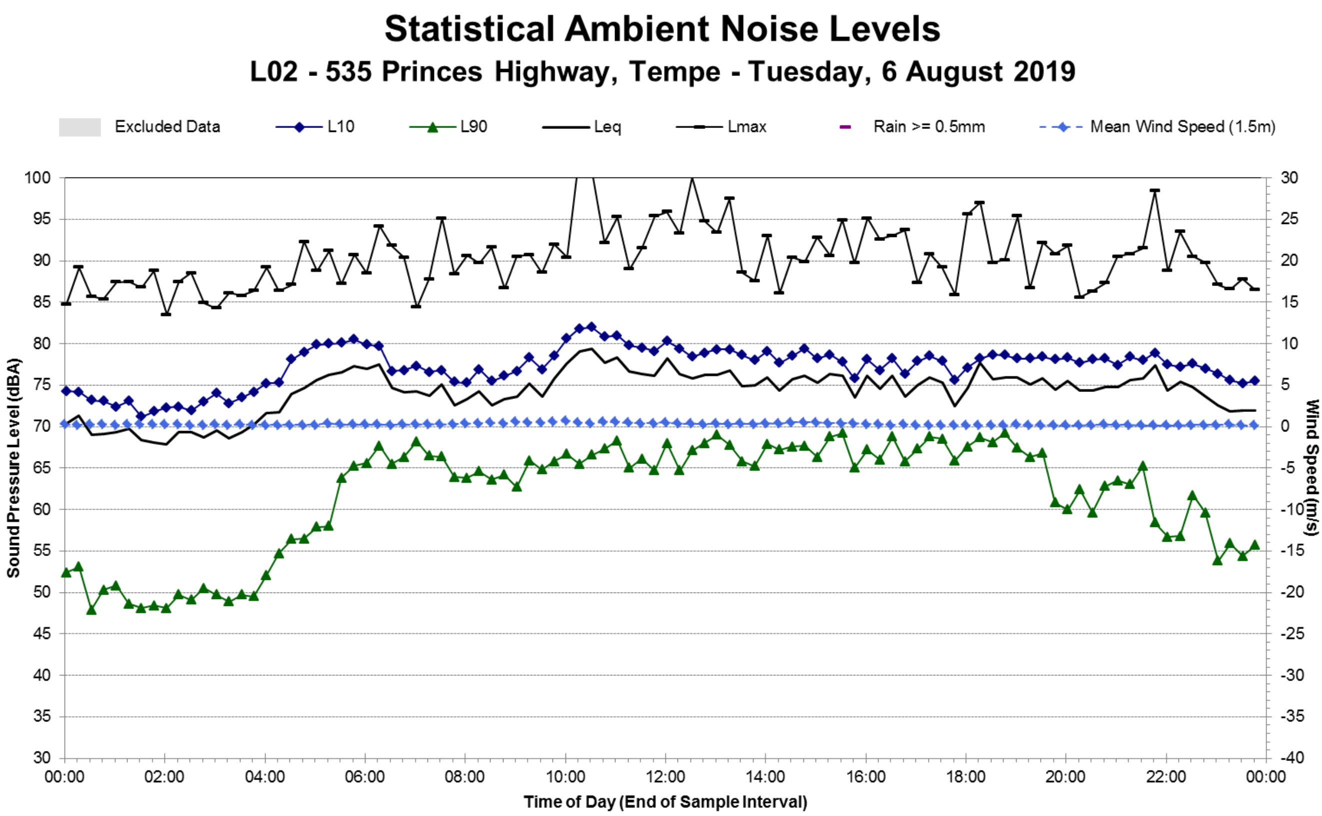


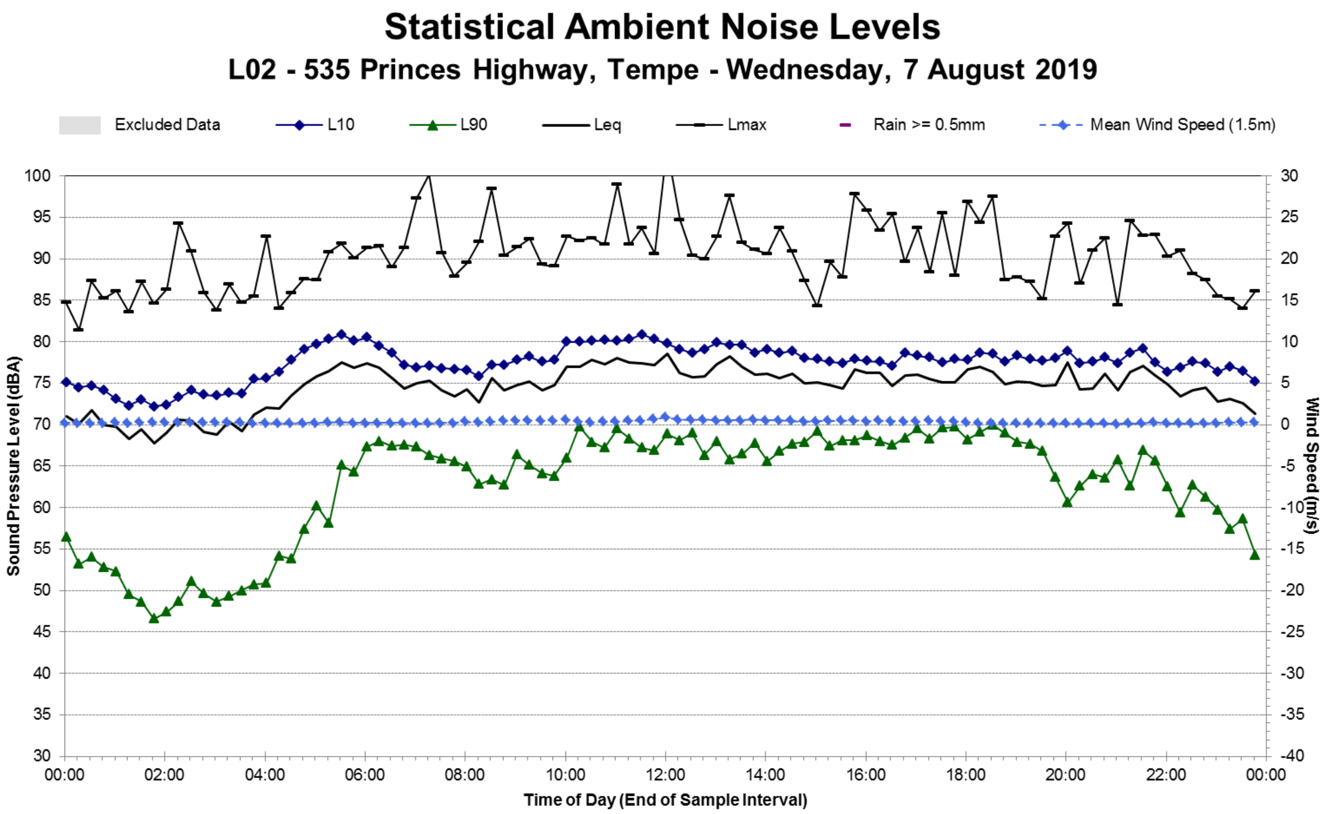
Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Saturday, 3 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

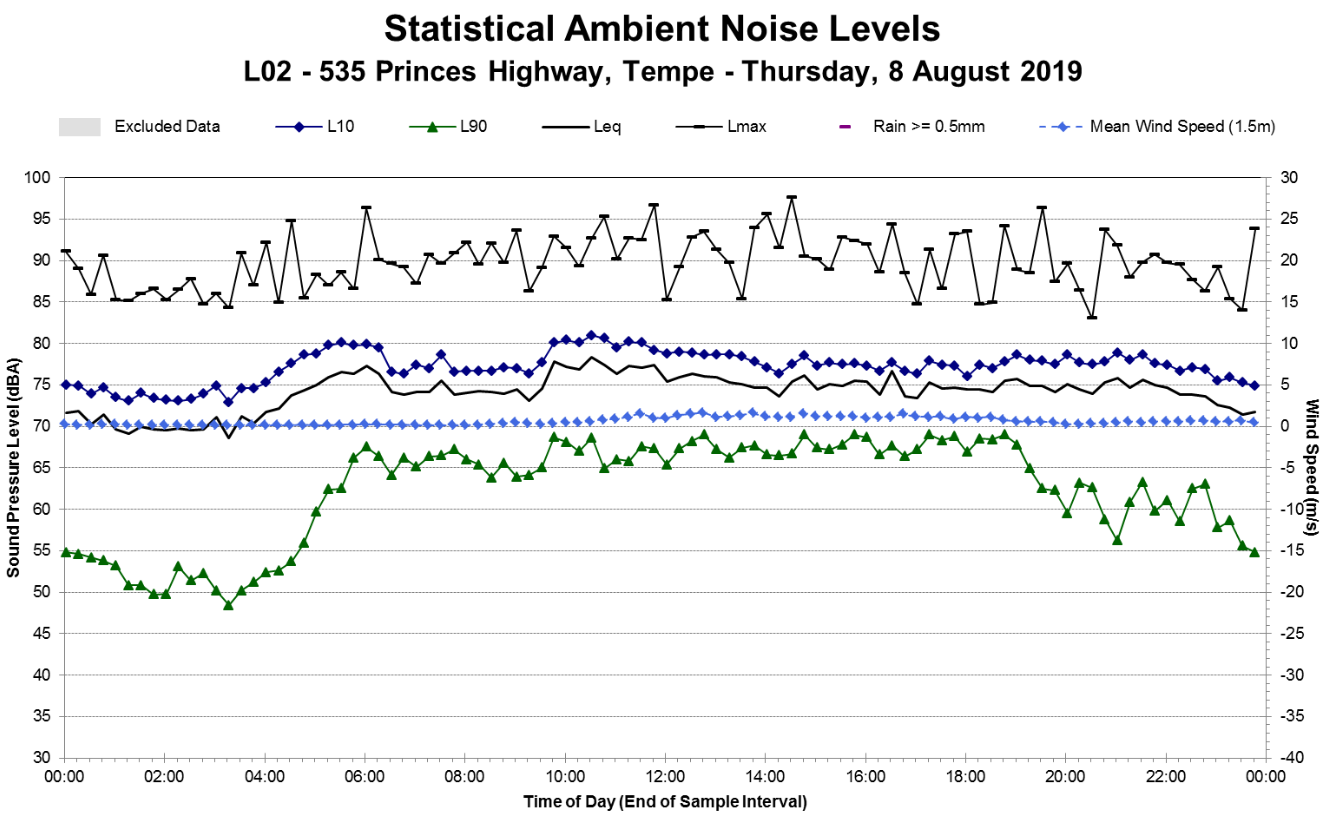


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Sunday, 4 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Monday, 5 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Tuesday, 6 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Wednesday, 7 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Thursday, 8 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
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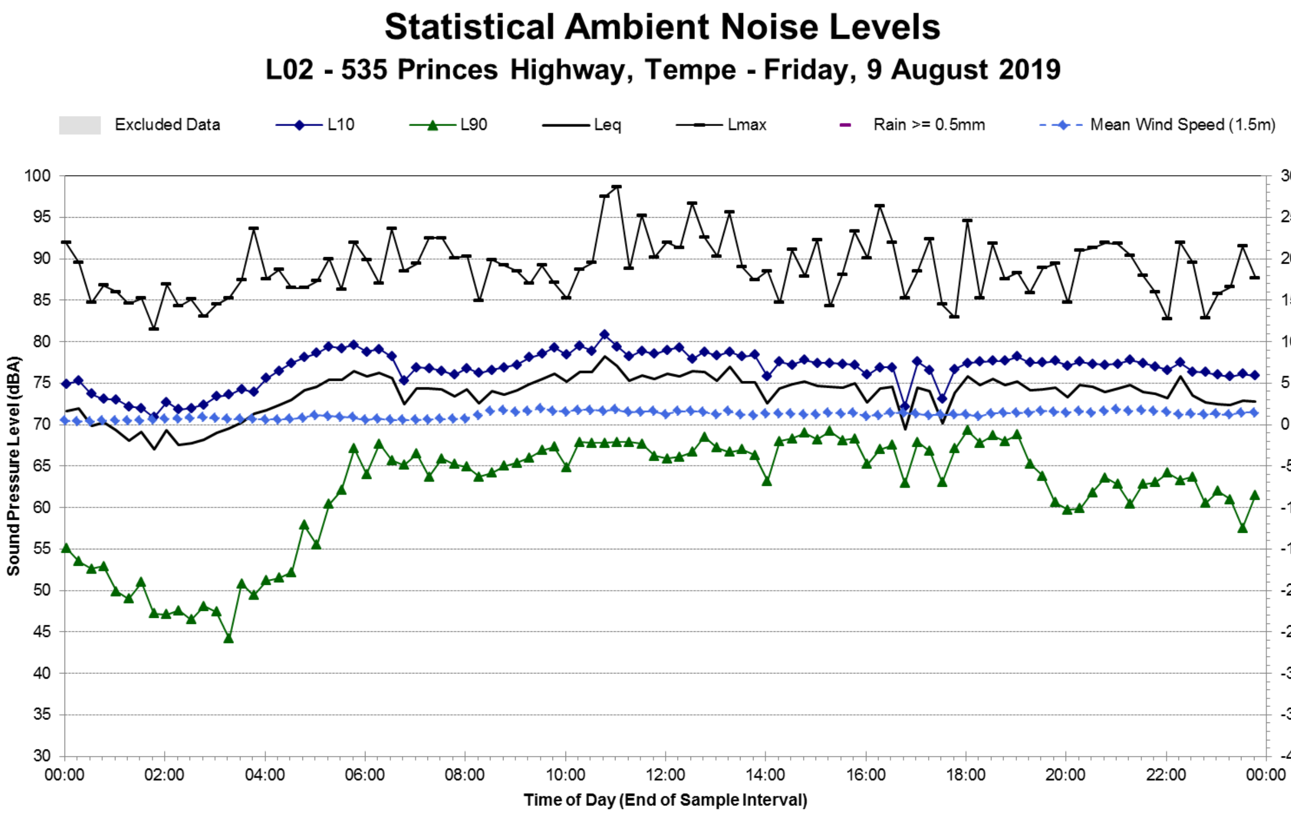
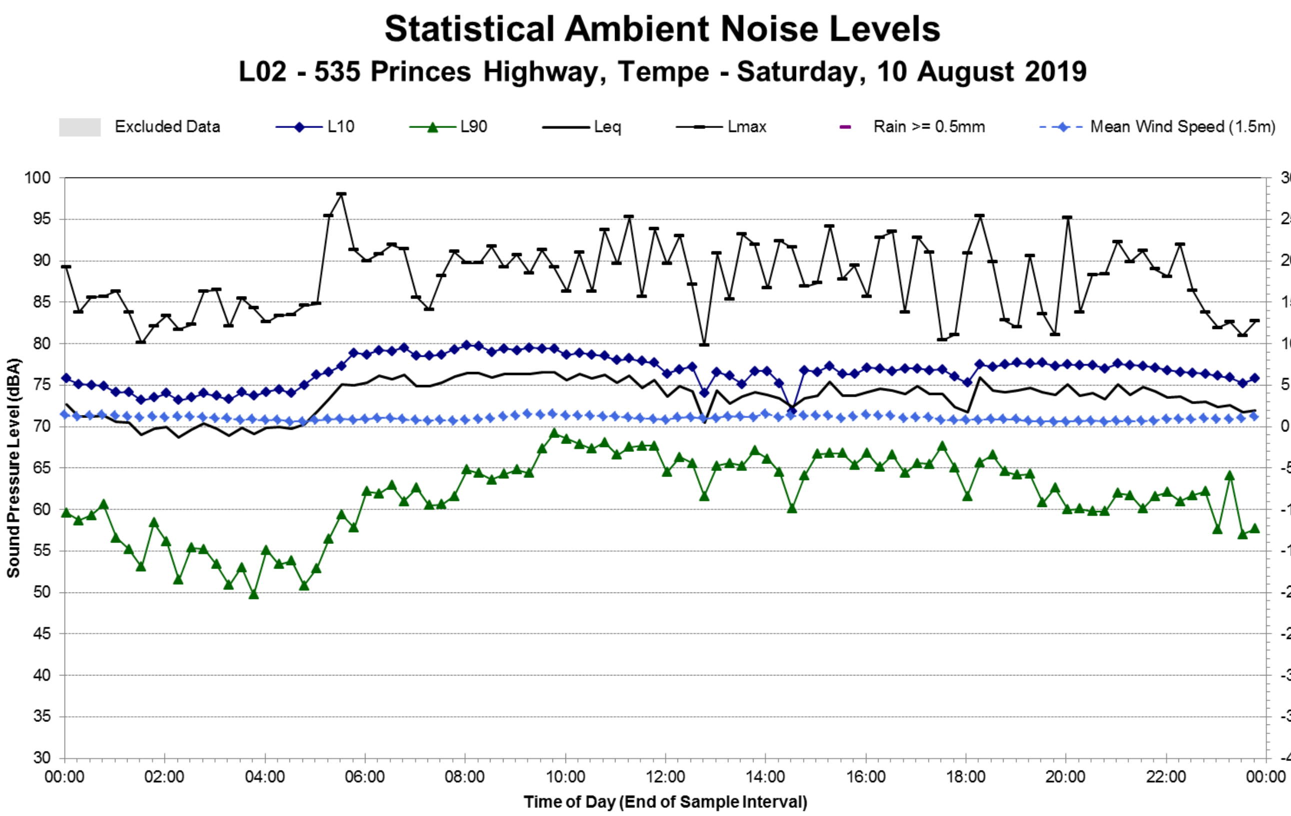
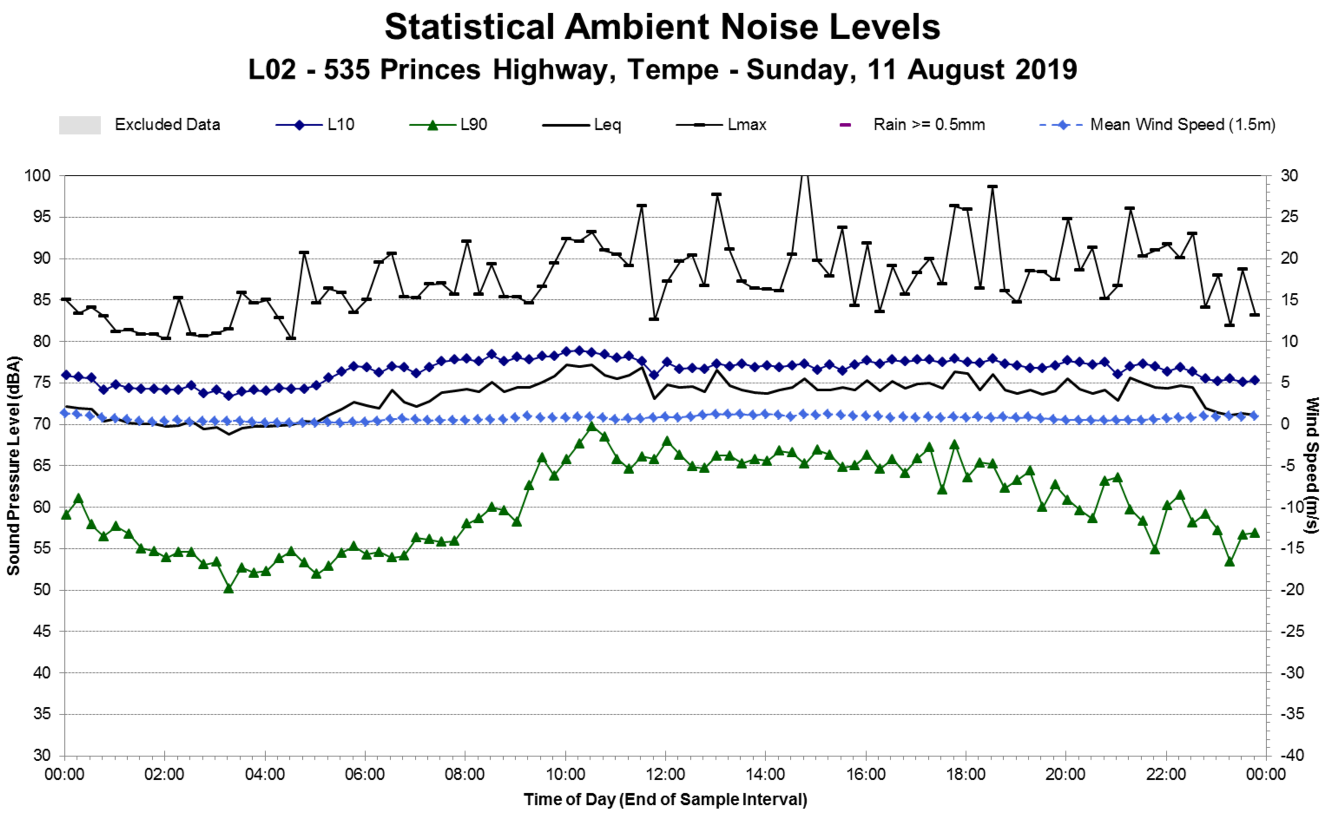
20:00
22:00
00:00


Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Friday, 9 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

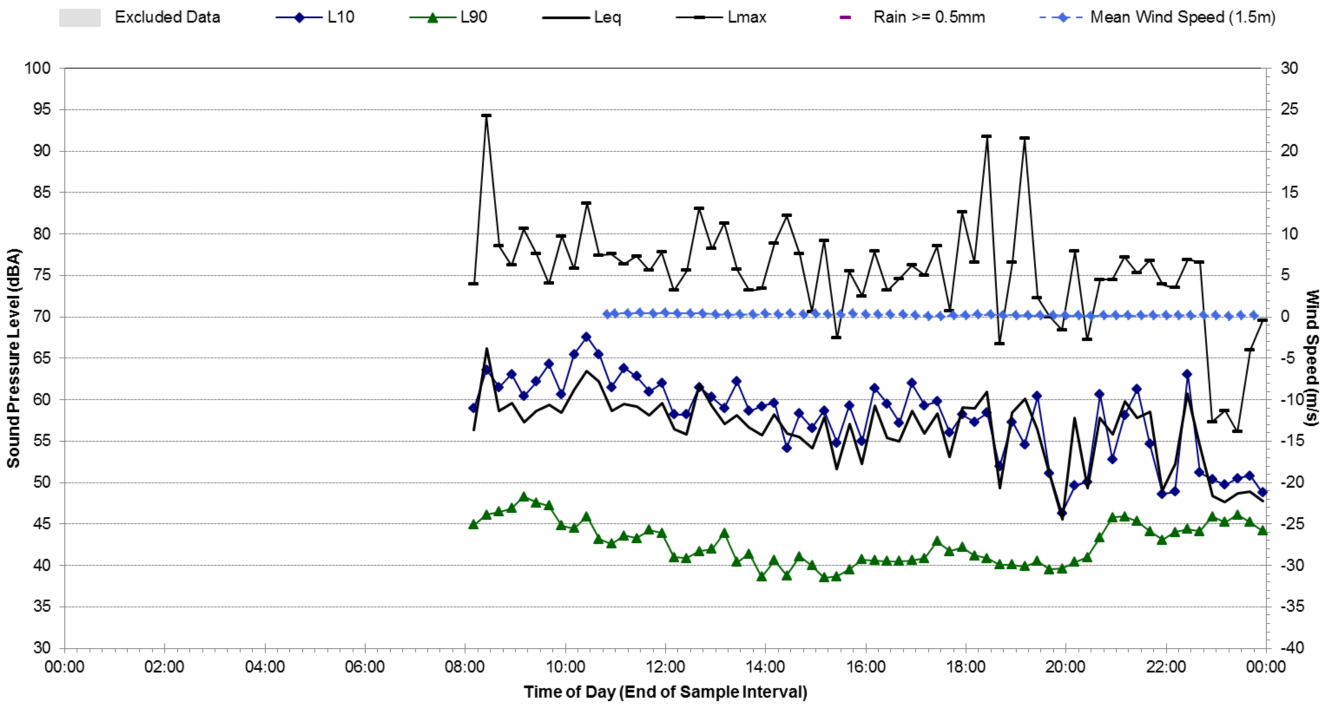

Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Saturday, 10 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
L02 - 535 Princes Highway, Tempe - Sunday, 11 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00

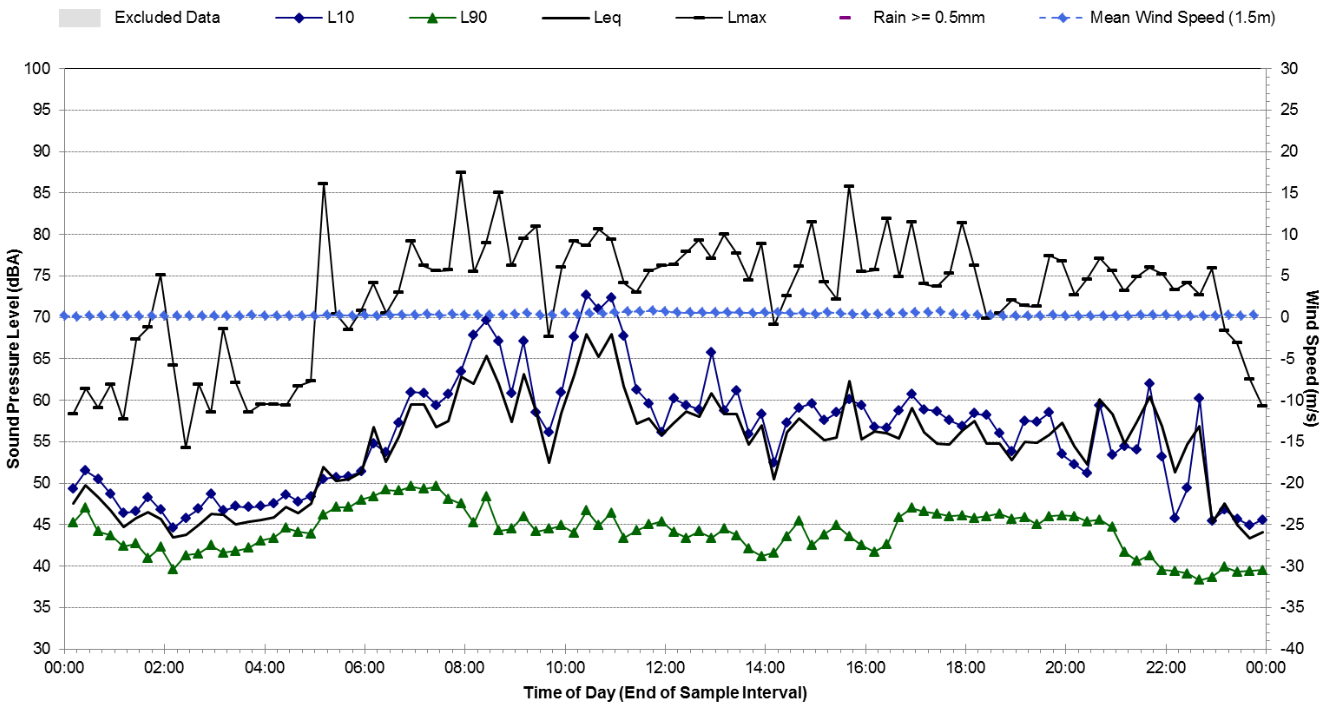
Statistical Ambient Noise Levels

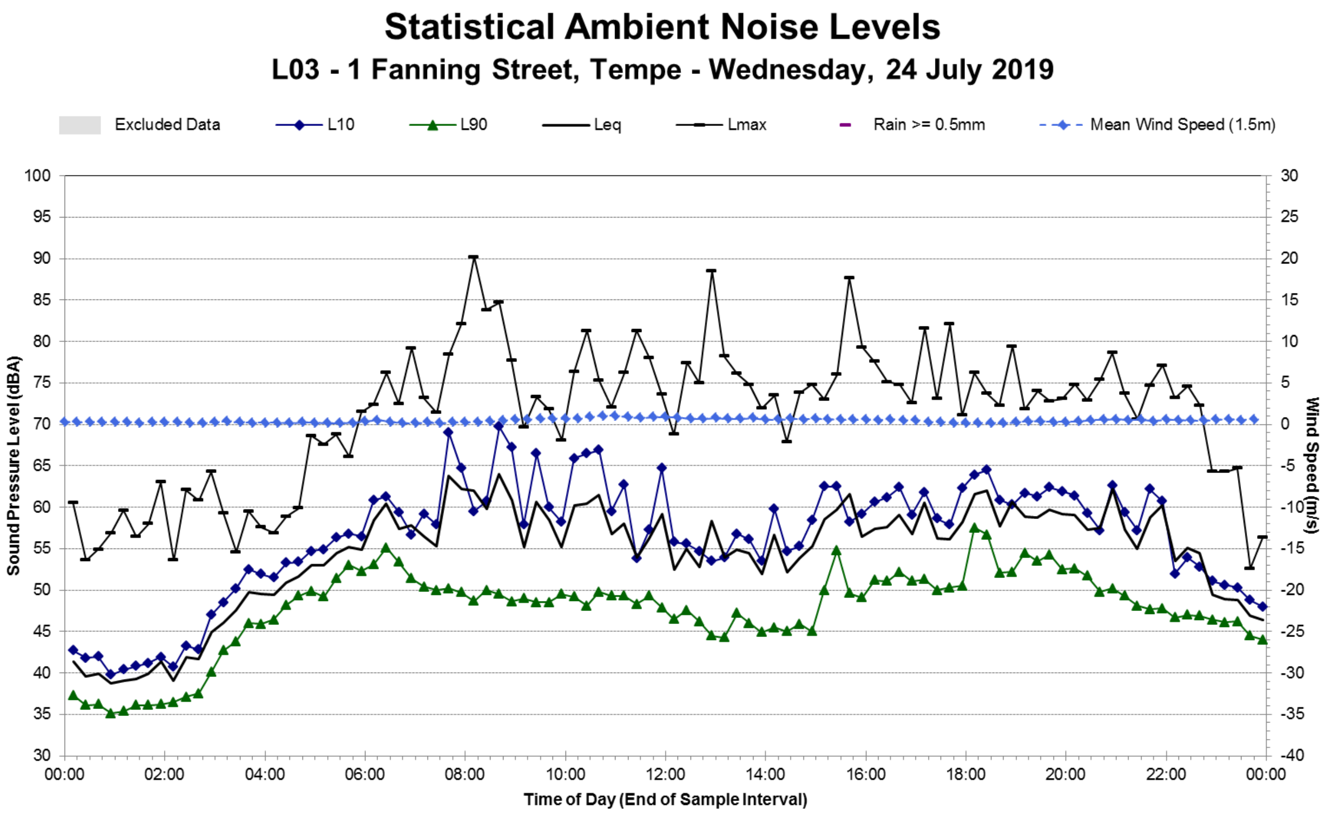
L03 - 1 Fanning Street, Tempe - Monday, 22 July 2019

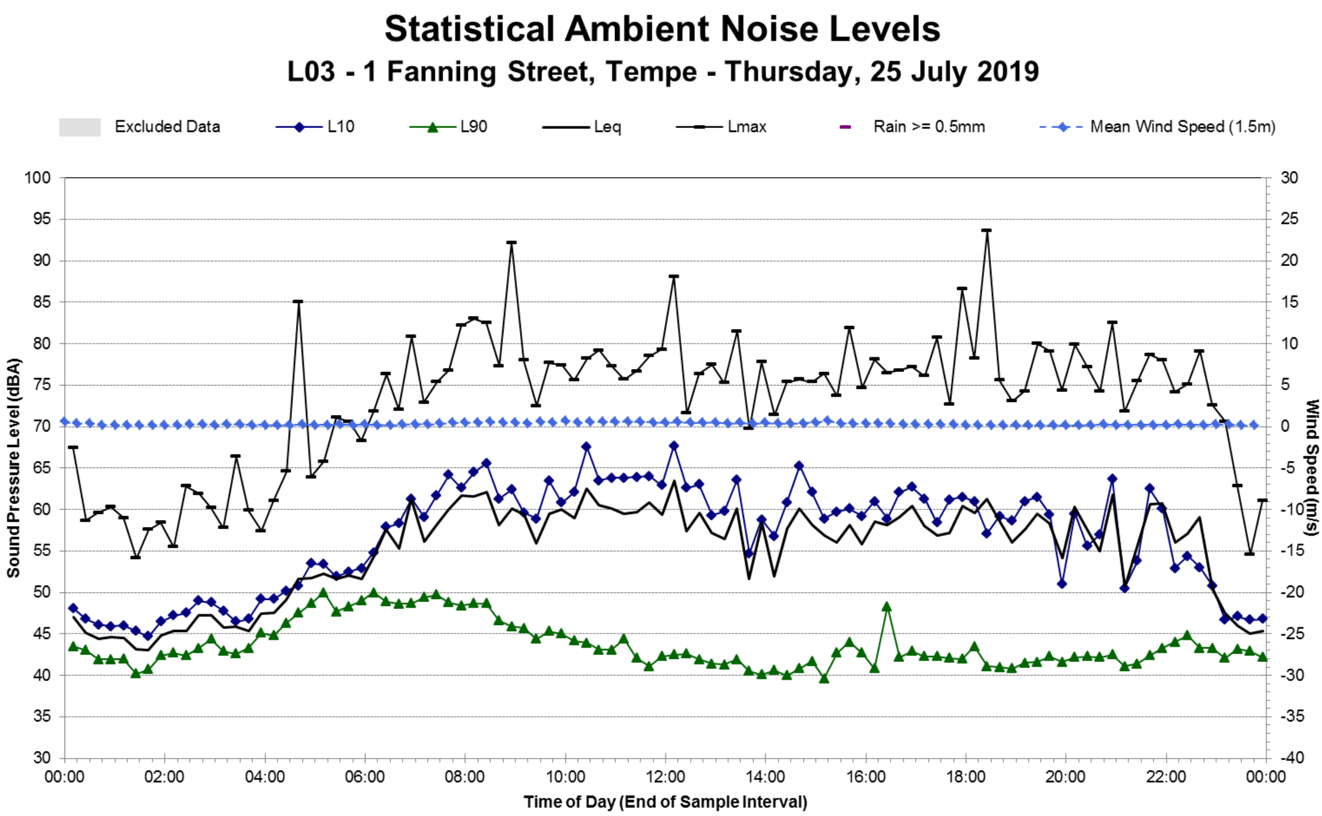


Statistical Ambient Noise Levels

L03 - 1 Fanning Street, Tempe - Tuesday, 23 July 2019

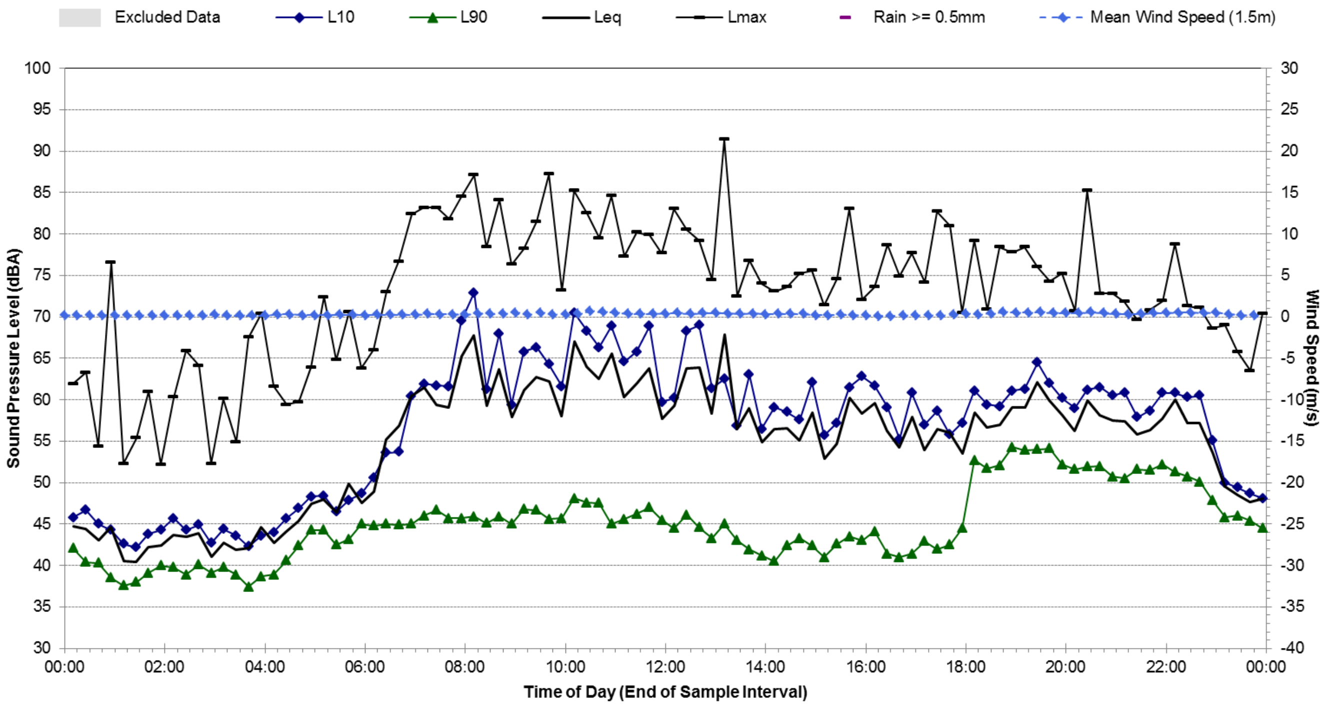



Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Wednesday, 24 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

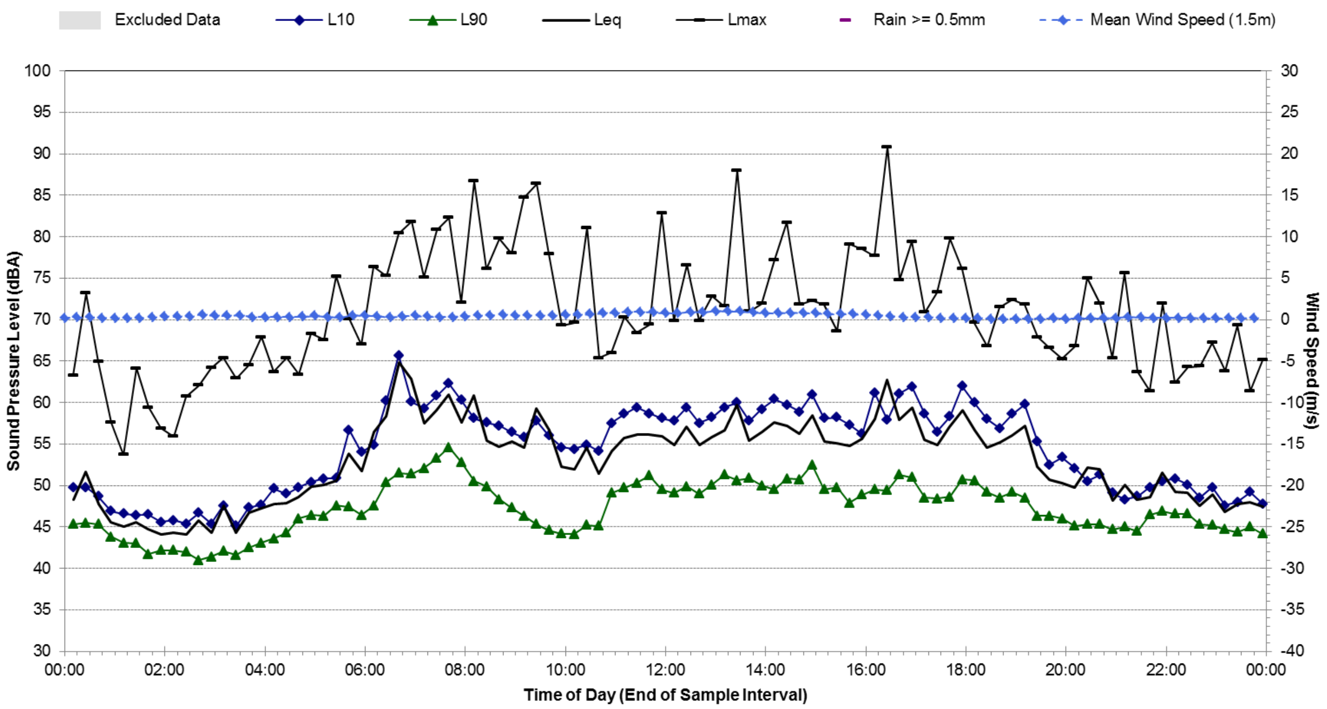
Statistical Ambient Noise Levels

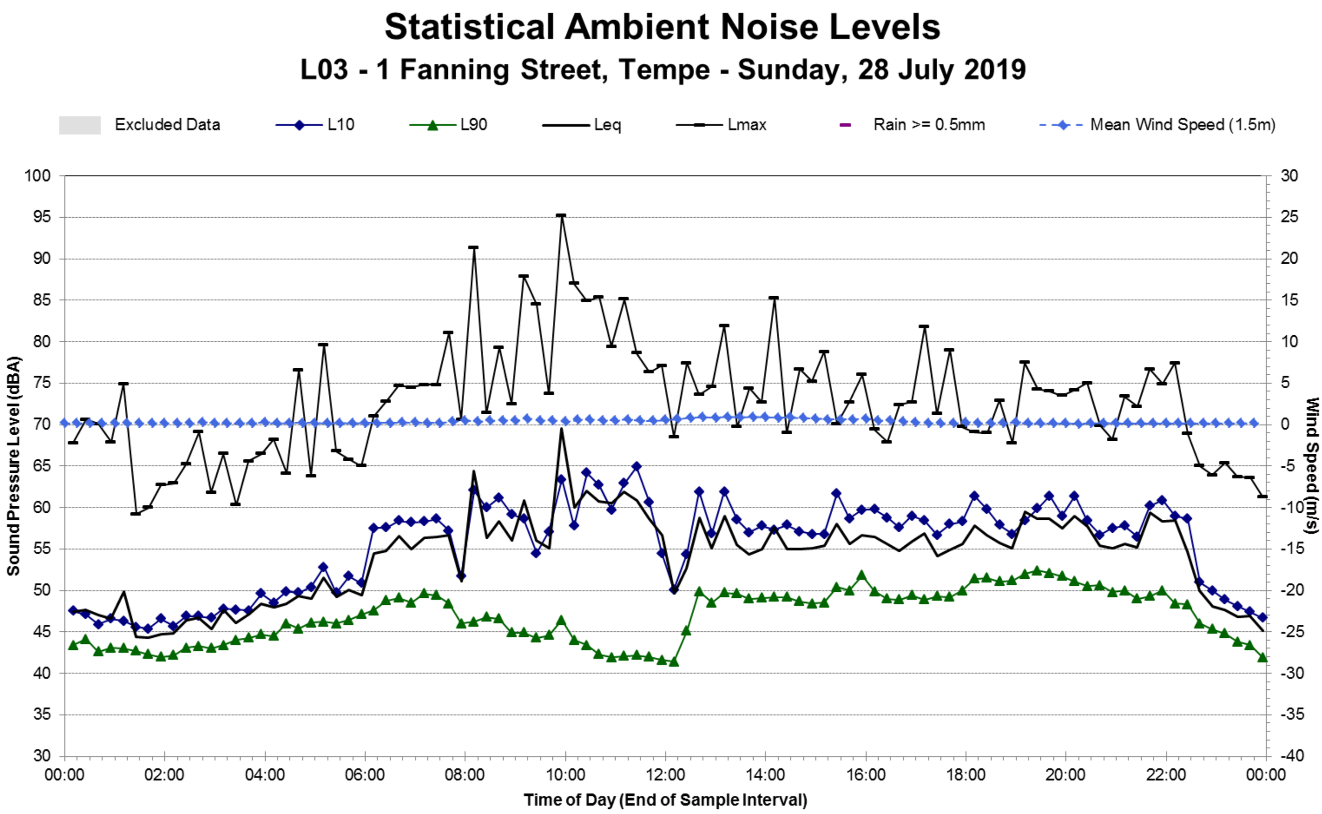
L03 - 1 Fanning Street, Tempe - Friday, 26 July 2019

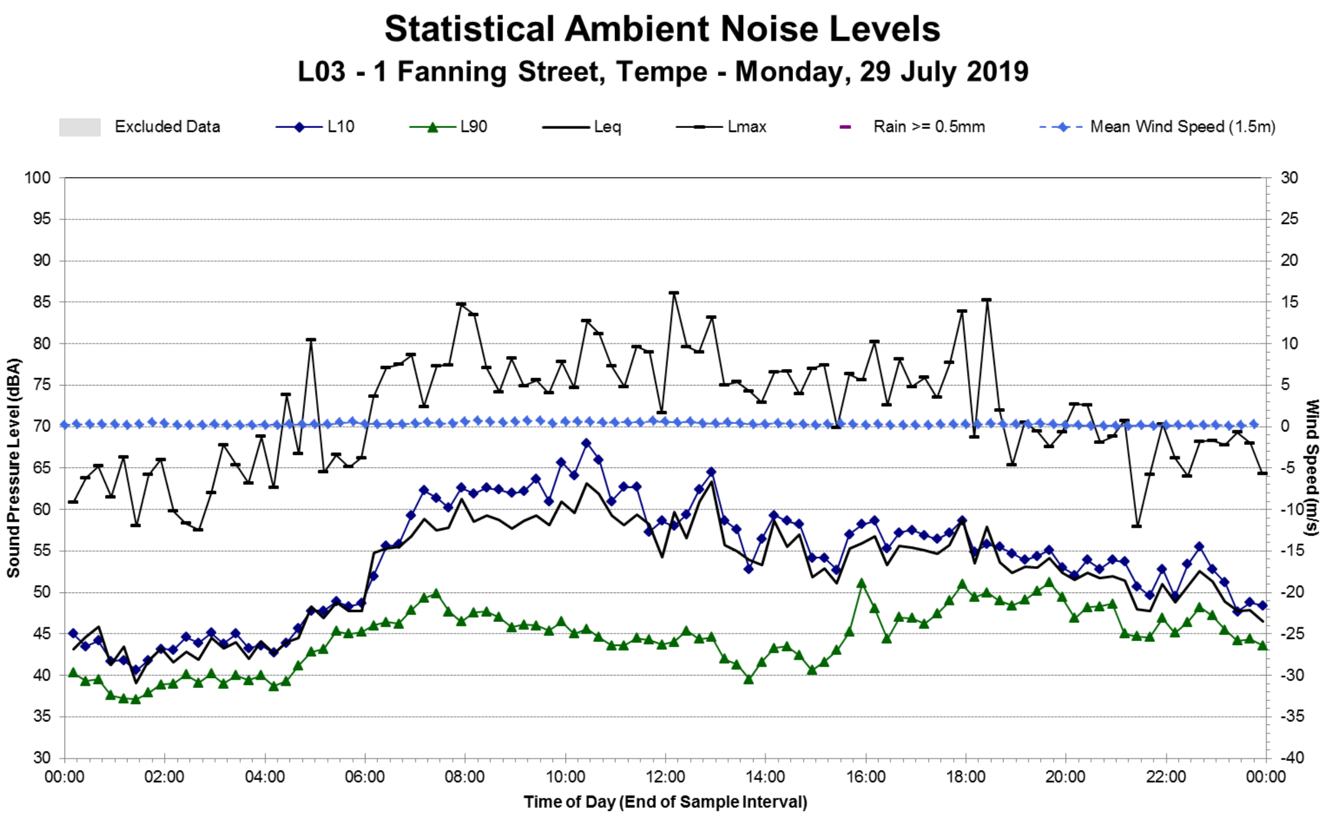


Statistical Ambient Noise Levels

L03 - 1 Fanning Street, Tempe - Saturday, 27 July 2019

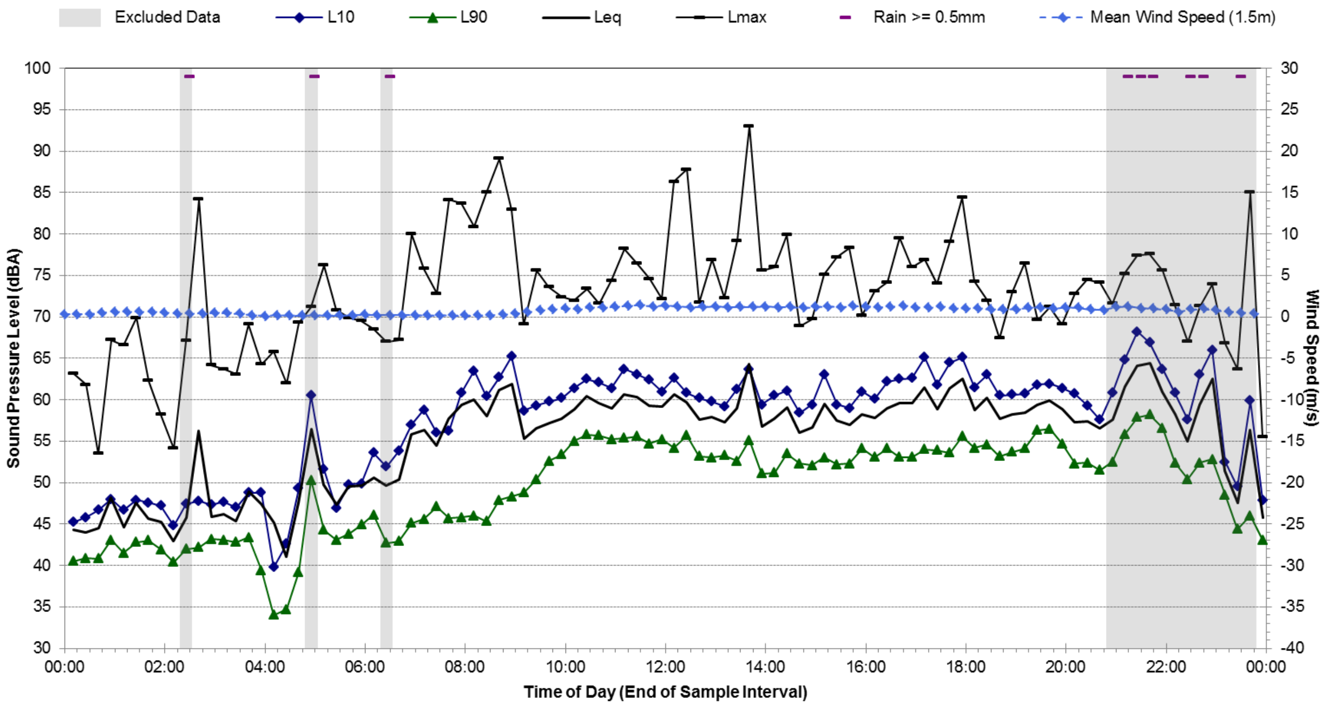



Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Sunday, 28 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Monday, 29 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

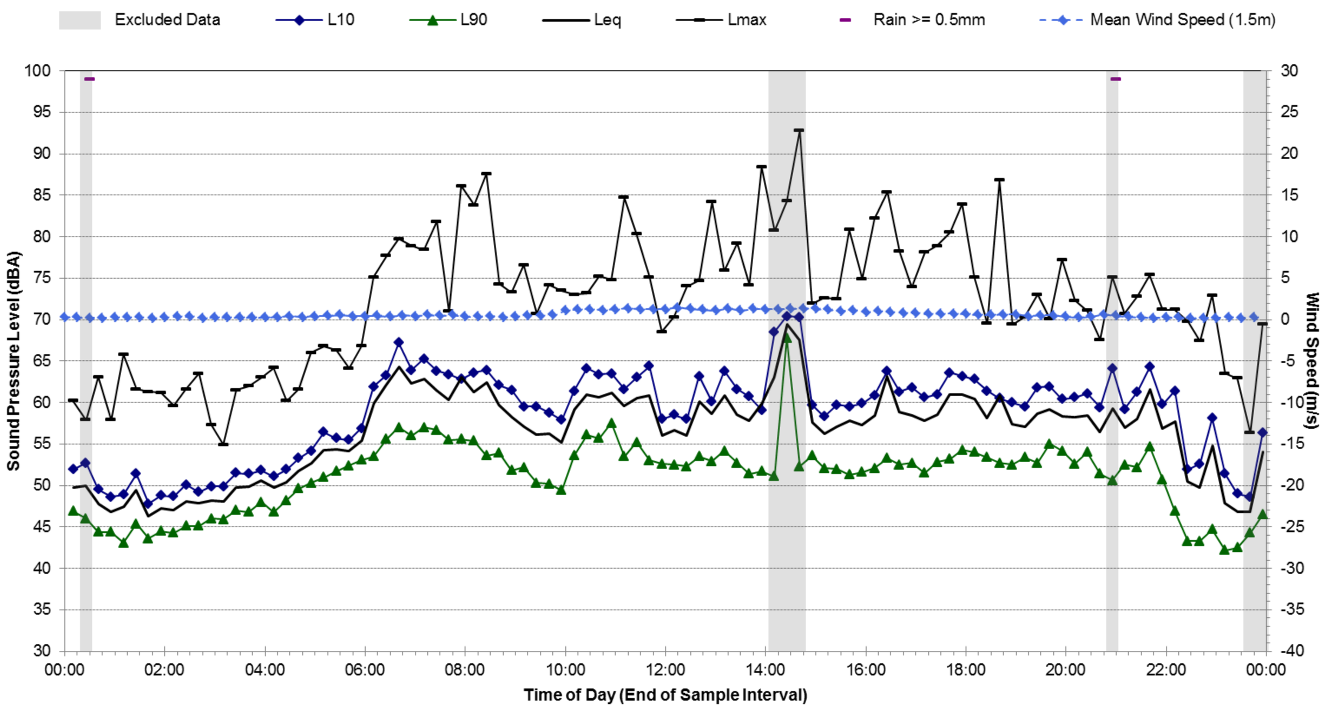
Statistical Ambient Noise Levels

L03 - 1 Fanning Street, Tempe - Tuesday, 30 July 2019



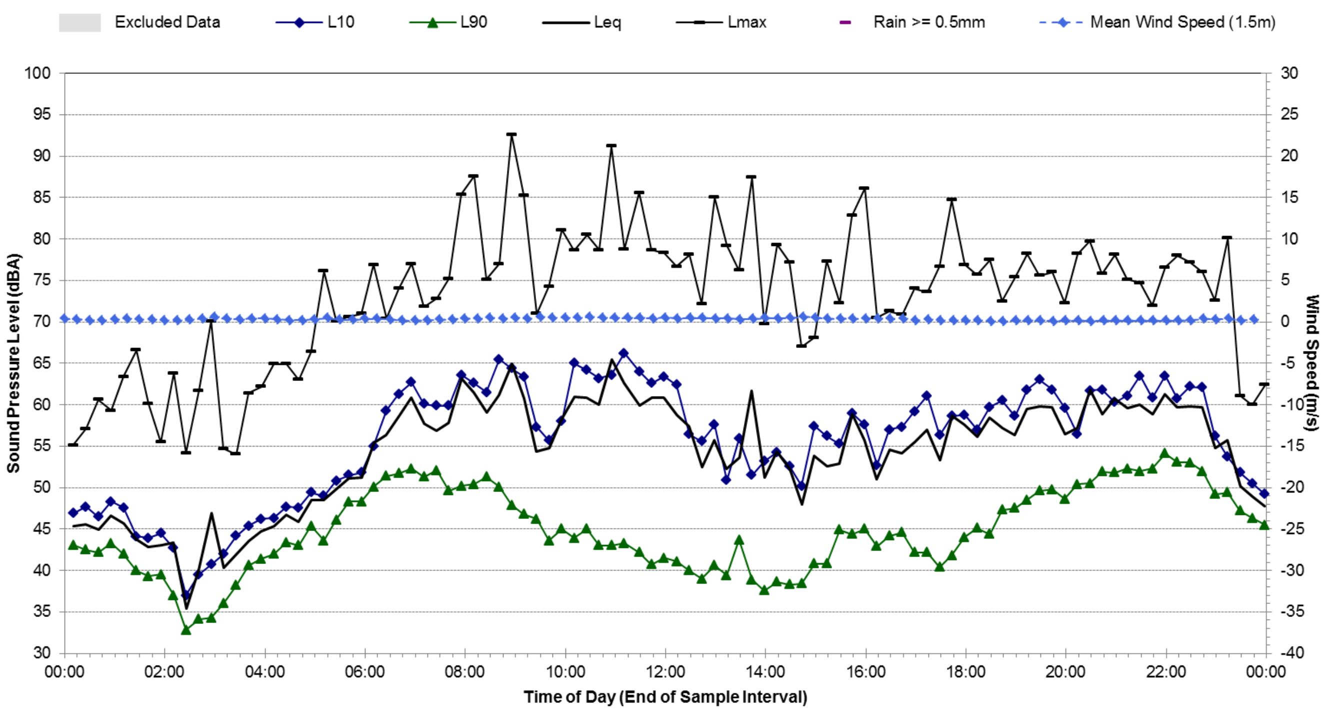
Statistical Ambient Noise Levels

L03 - 1 Fanning Street, Tempe - Wednesday, 31 July 2019



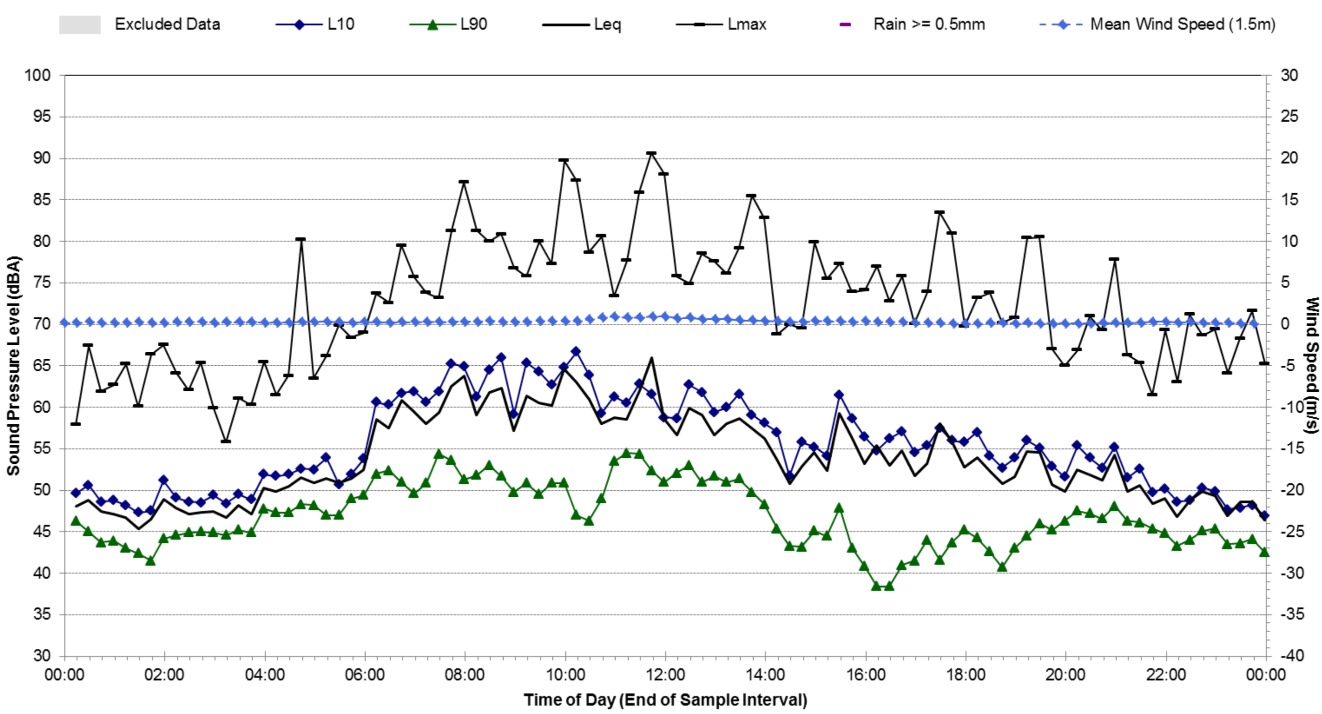
Statistical Ambient Noise Levels

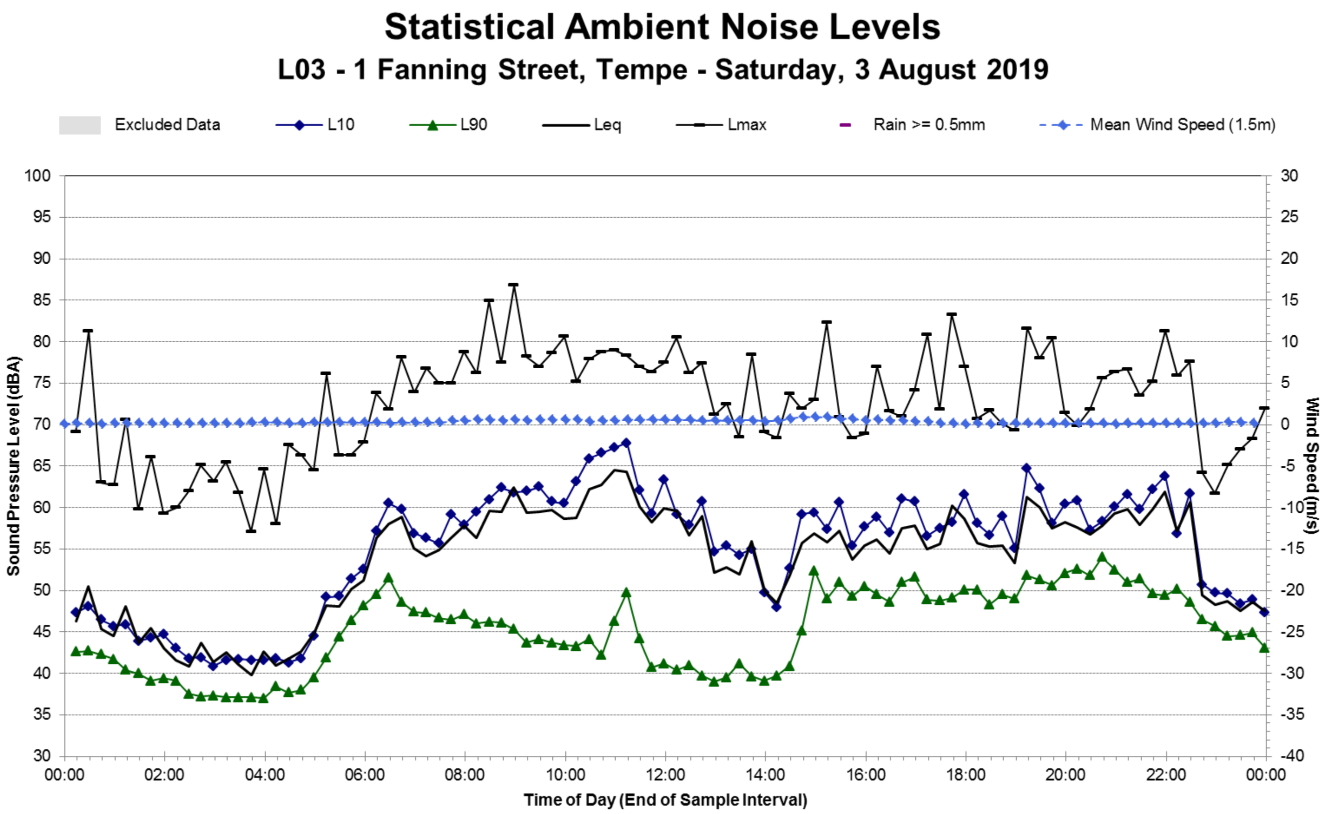
L03 - 1 Fanning Street, Tempe - Thursday, 1 August 2019

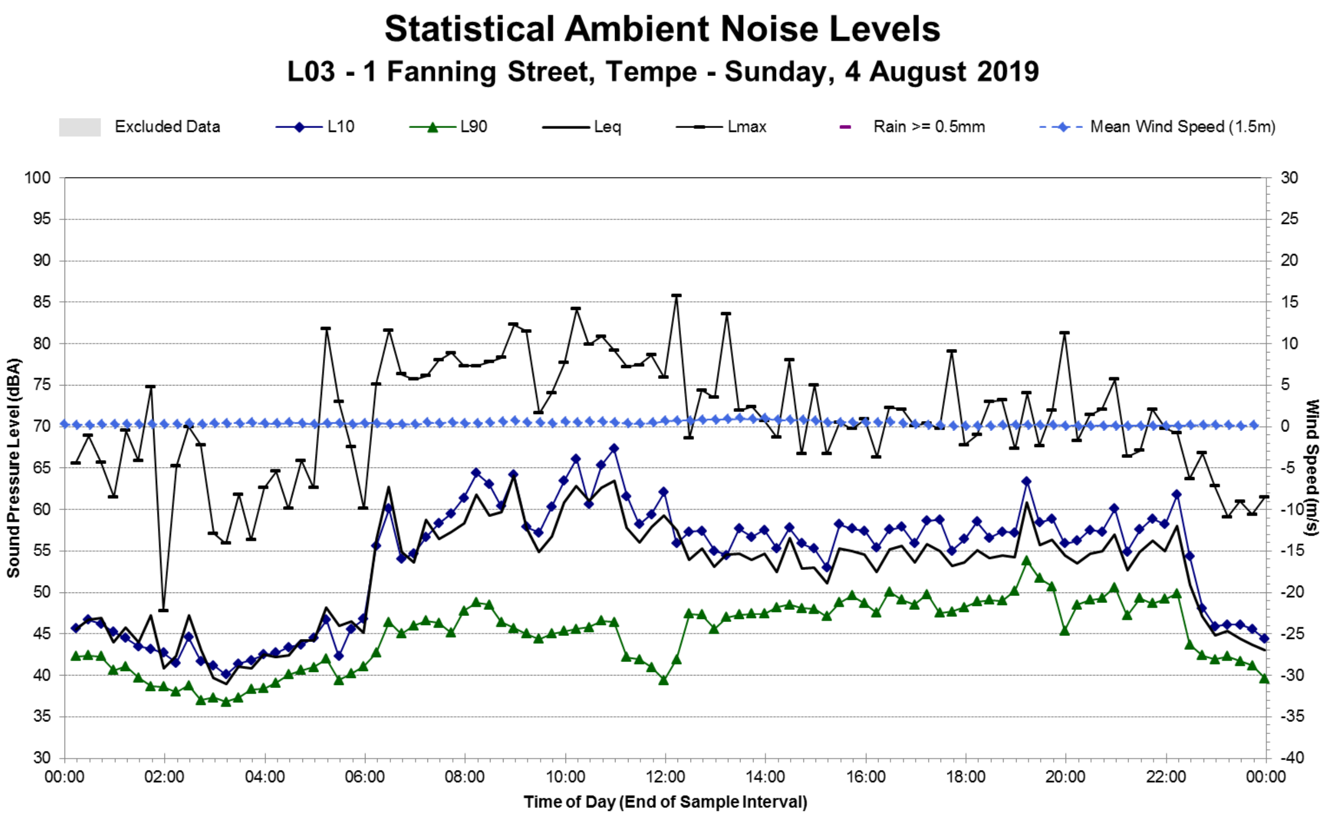


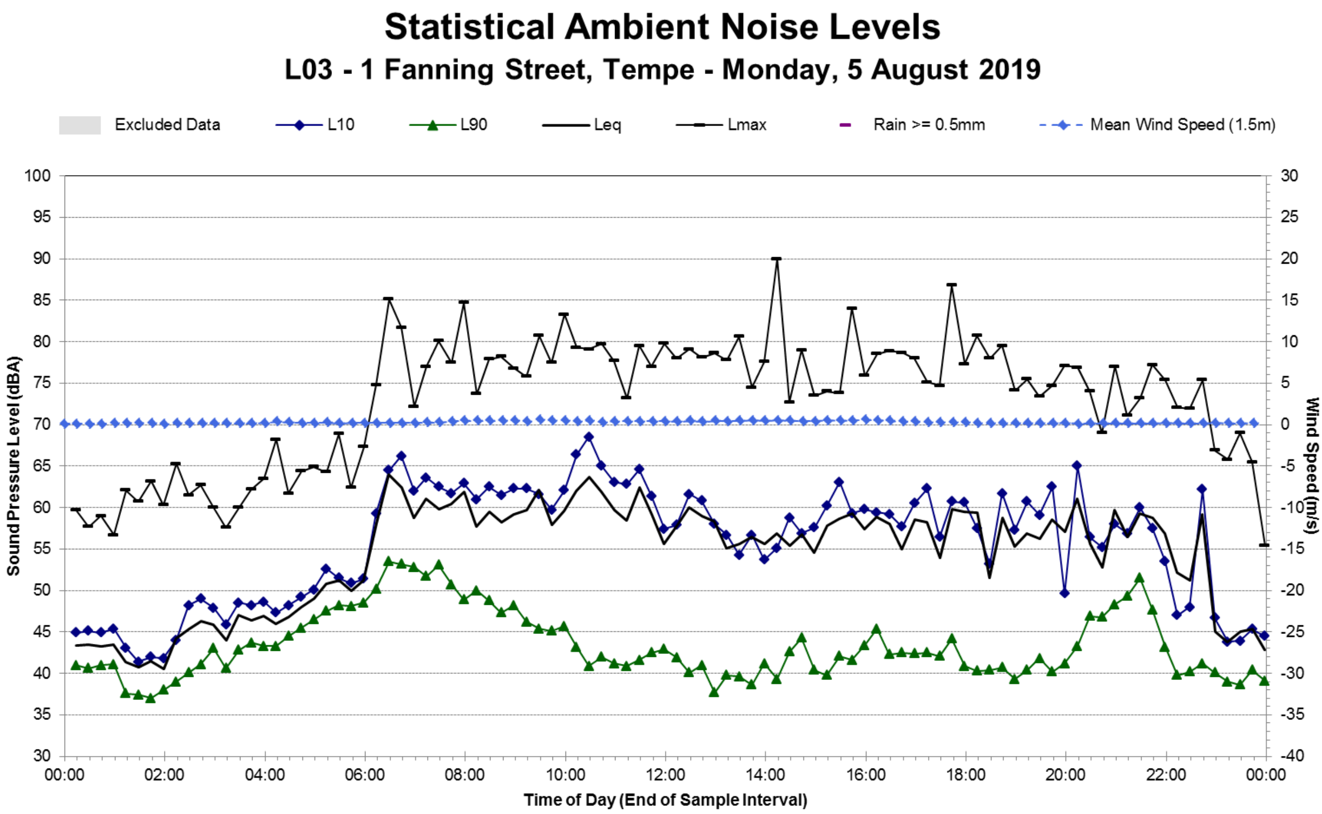
Statistical Ambient Noise Levels

L03 - 1 Fanning Street, Tempe - Friday, 2 August 2019

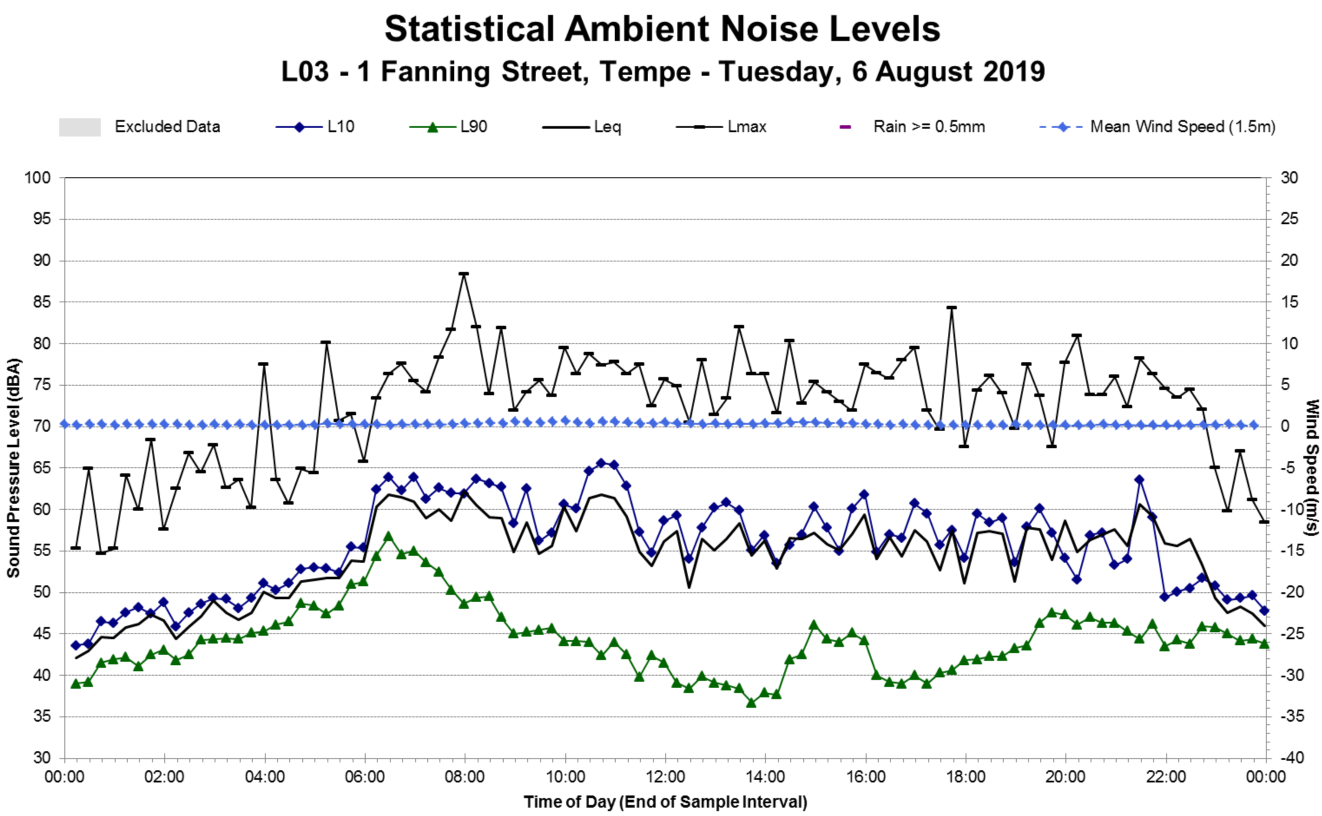



Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Saturday, 3 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

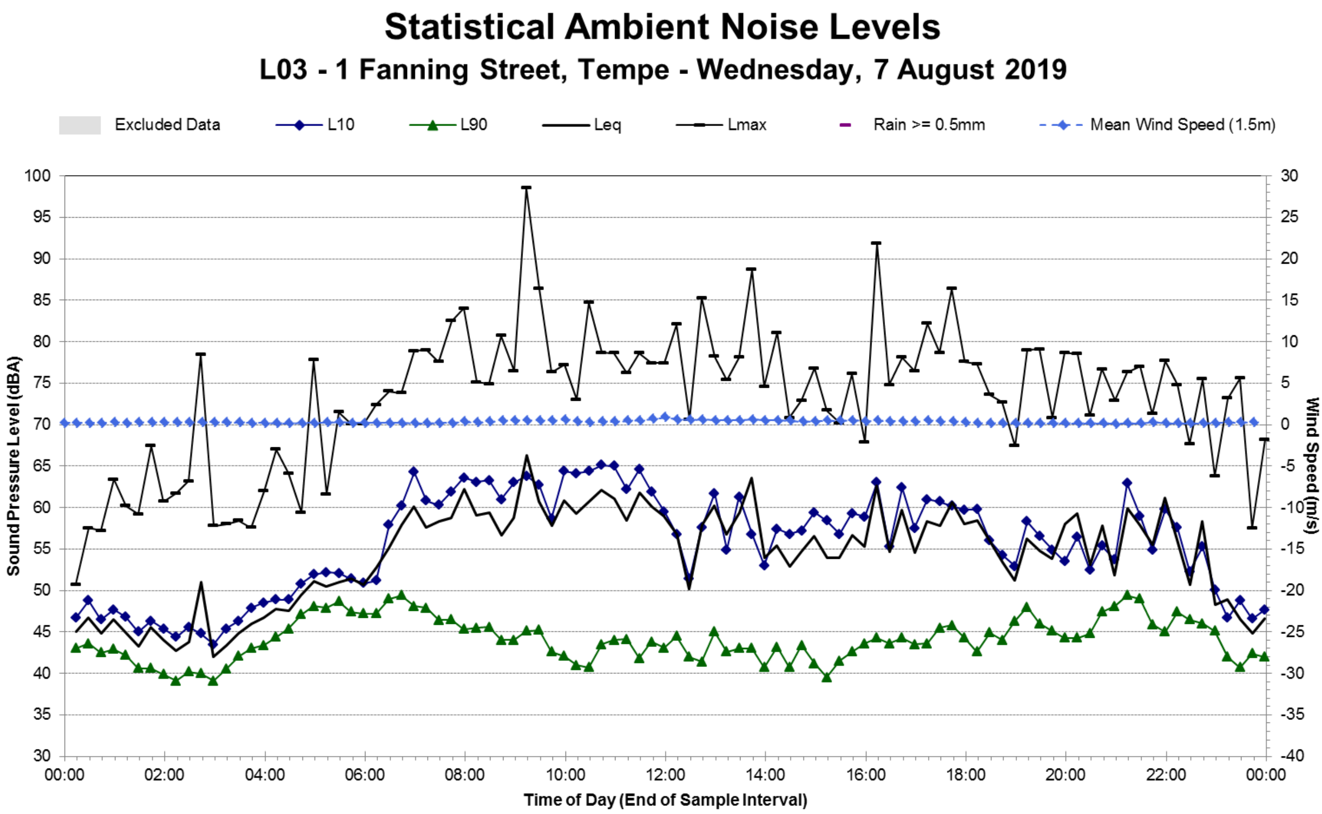

Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Sunday, 4 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



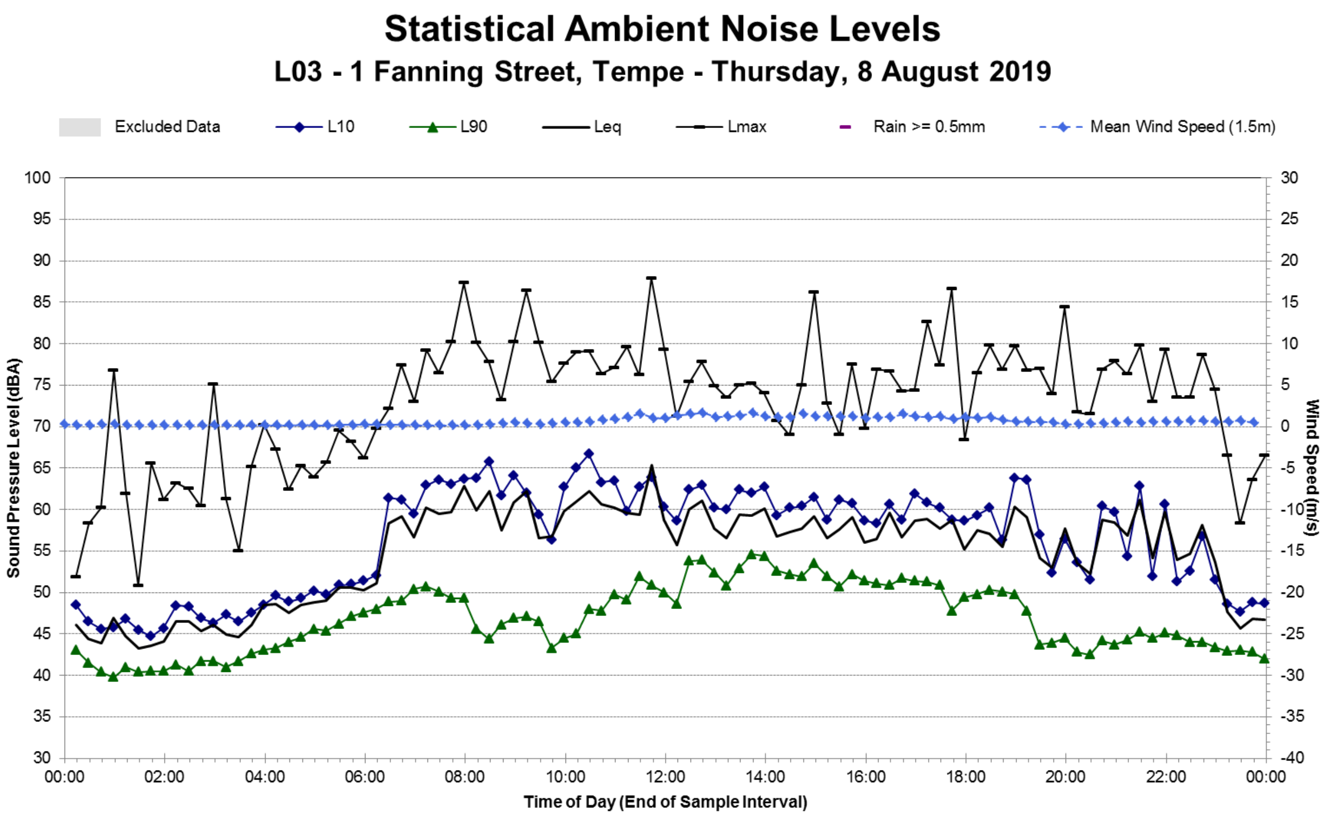
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Monday, 5 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



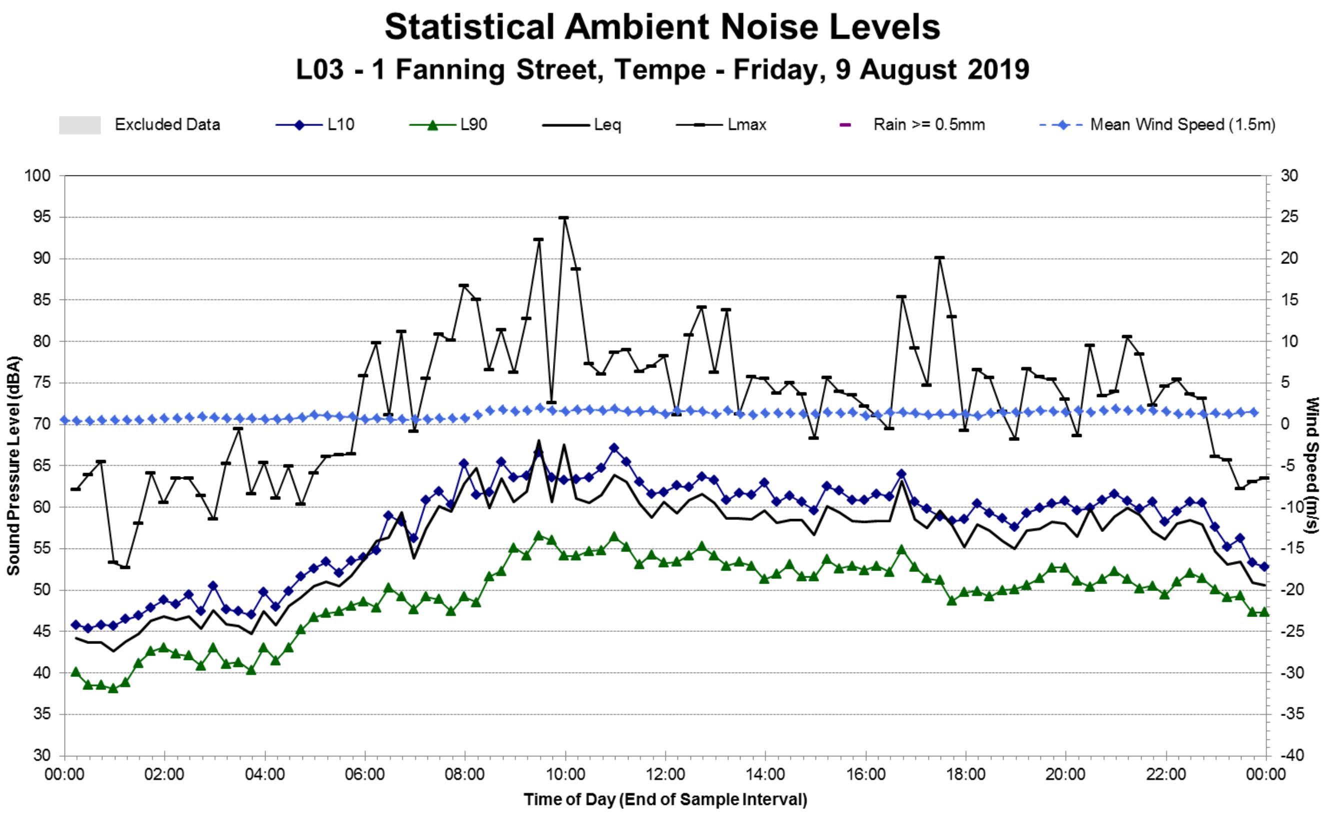
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Tuesday, 6 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



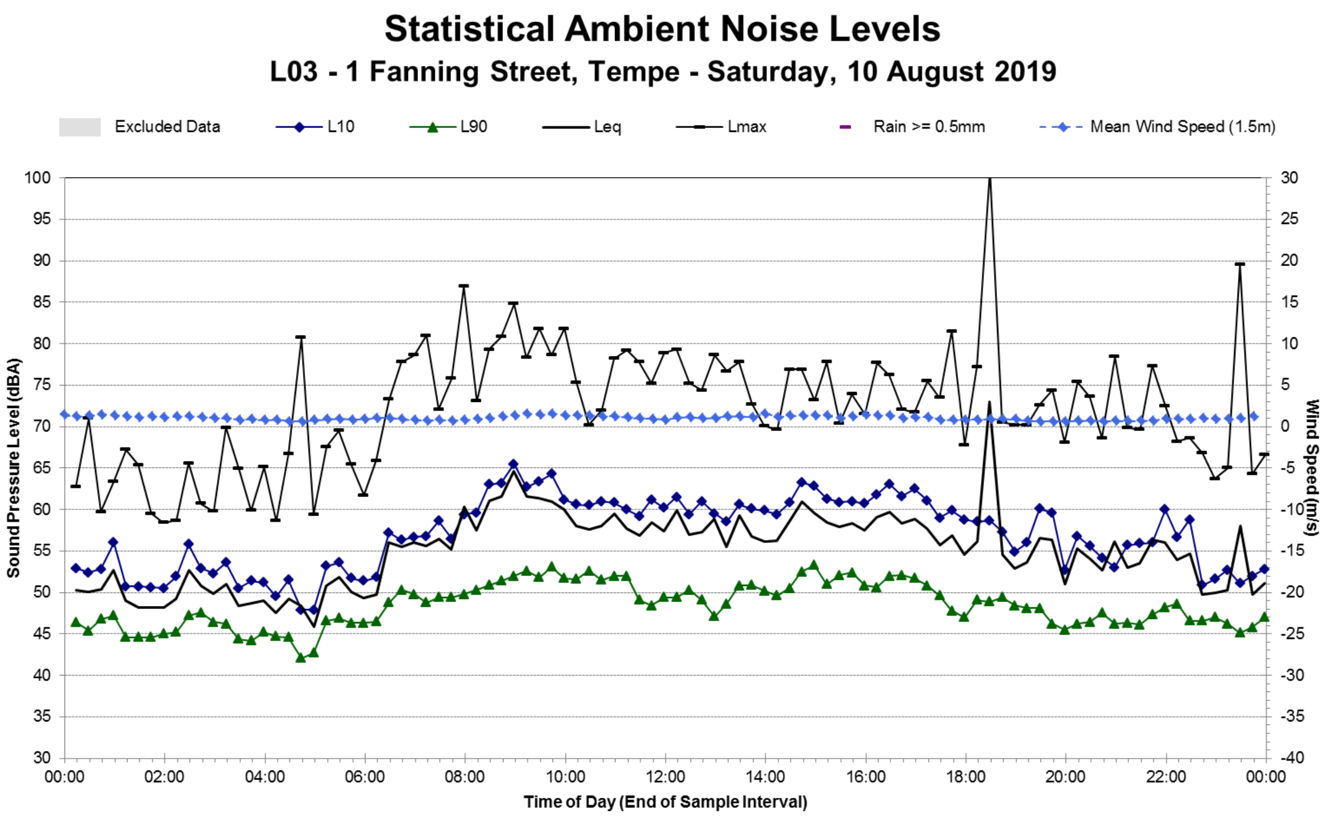
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Wednesday, 7 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



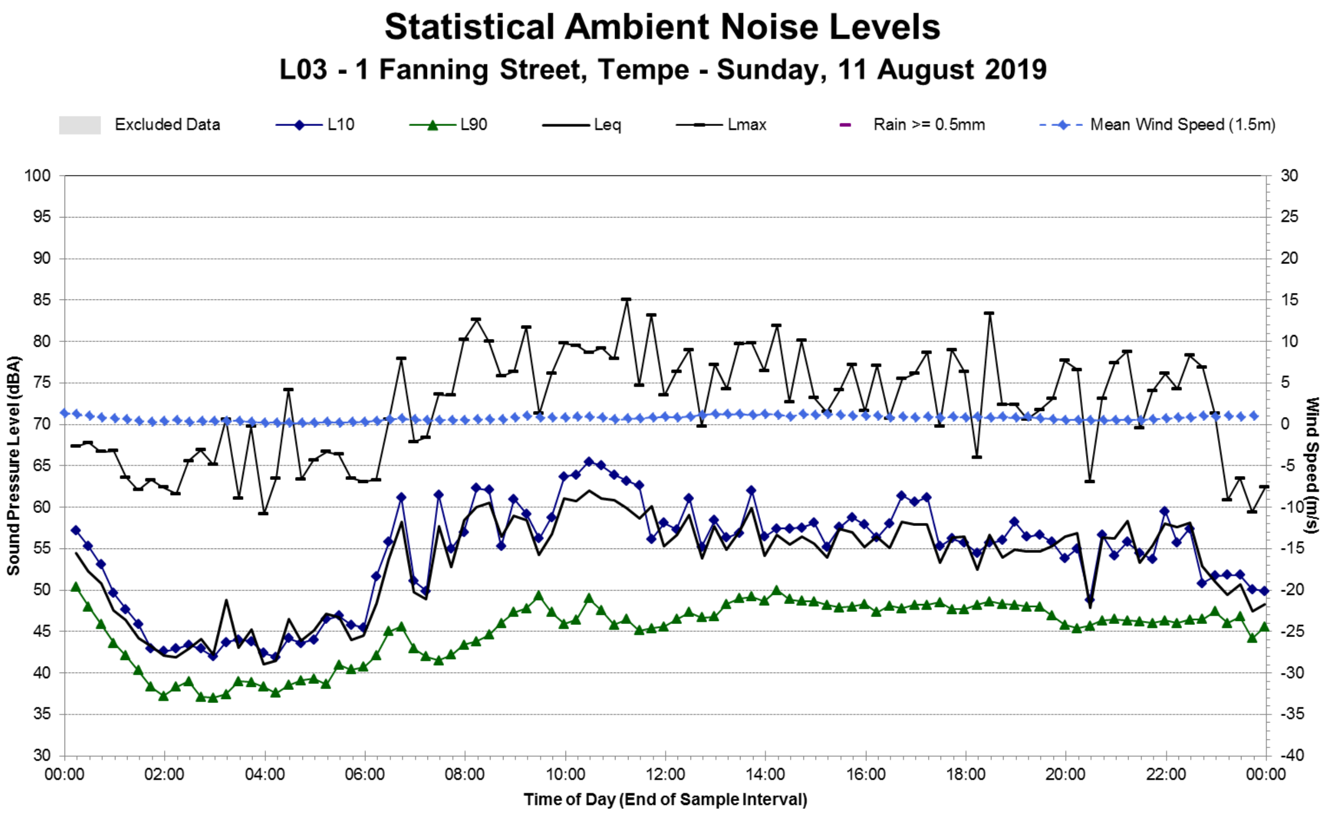
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Thursday, 8 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



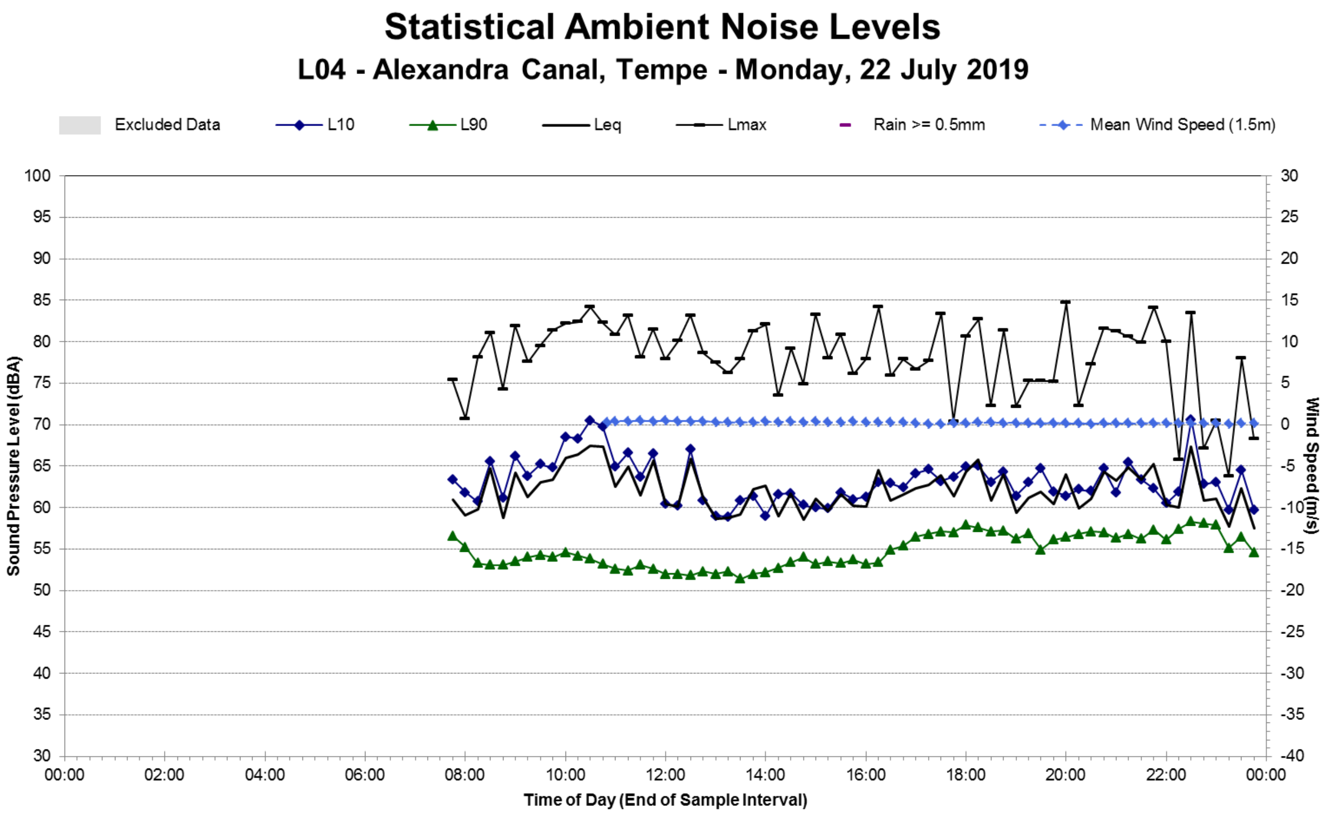
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Friday, 9 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

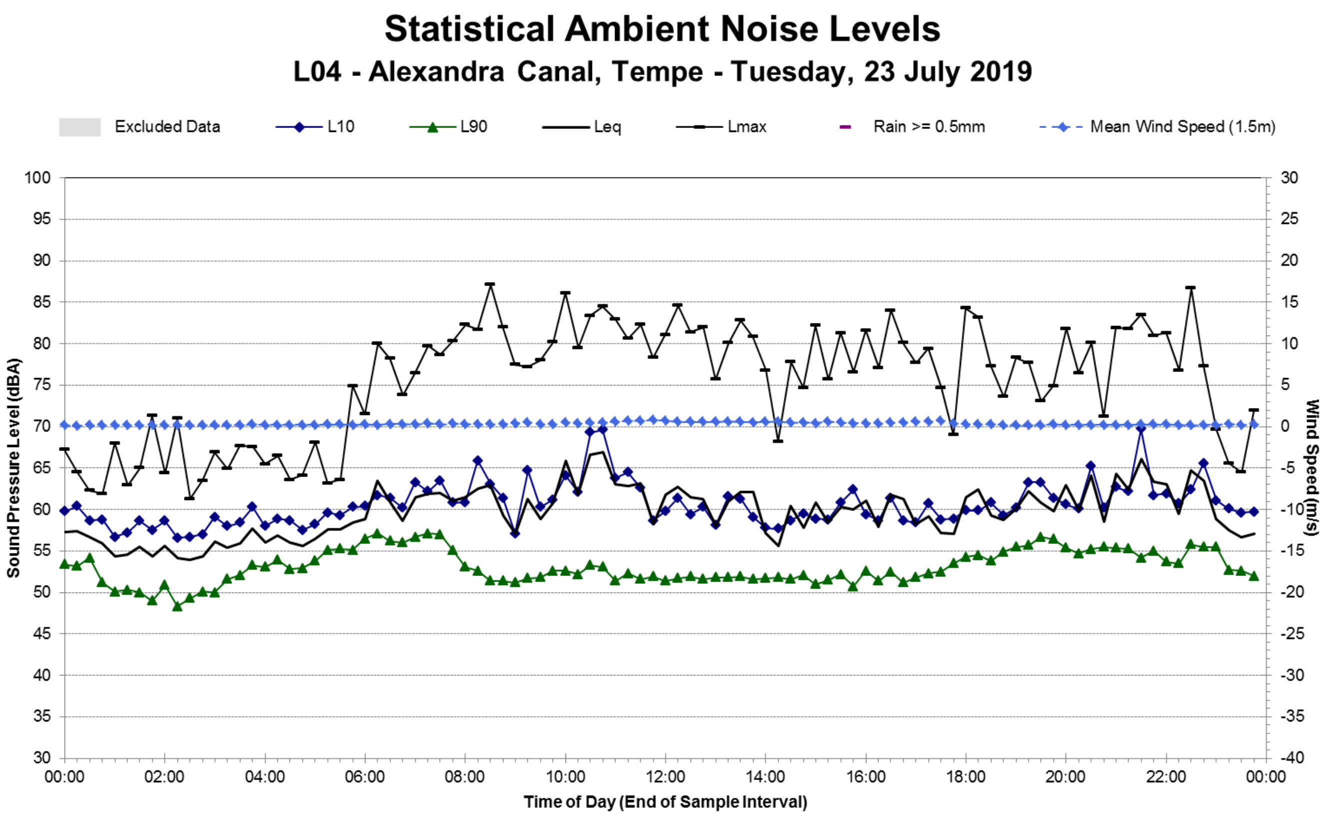


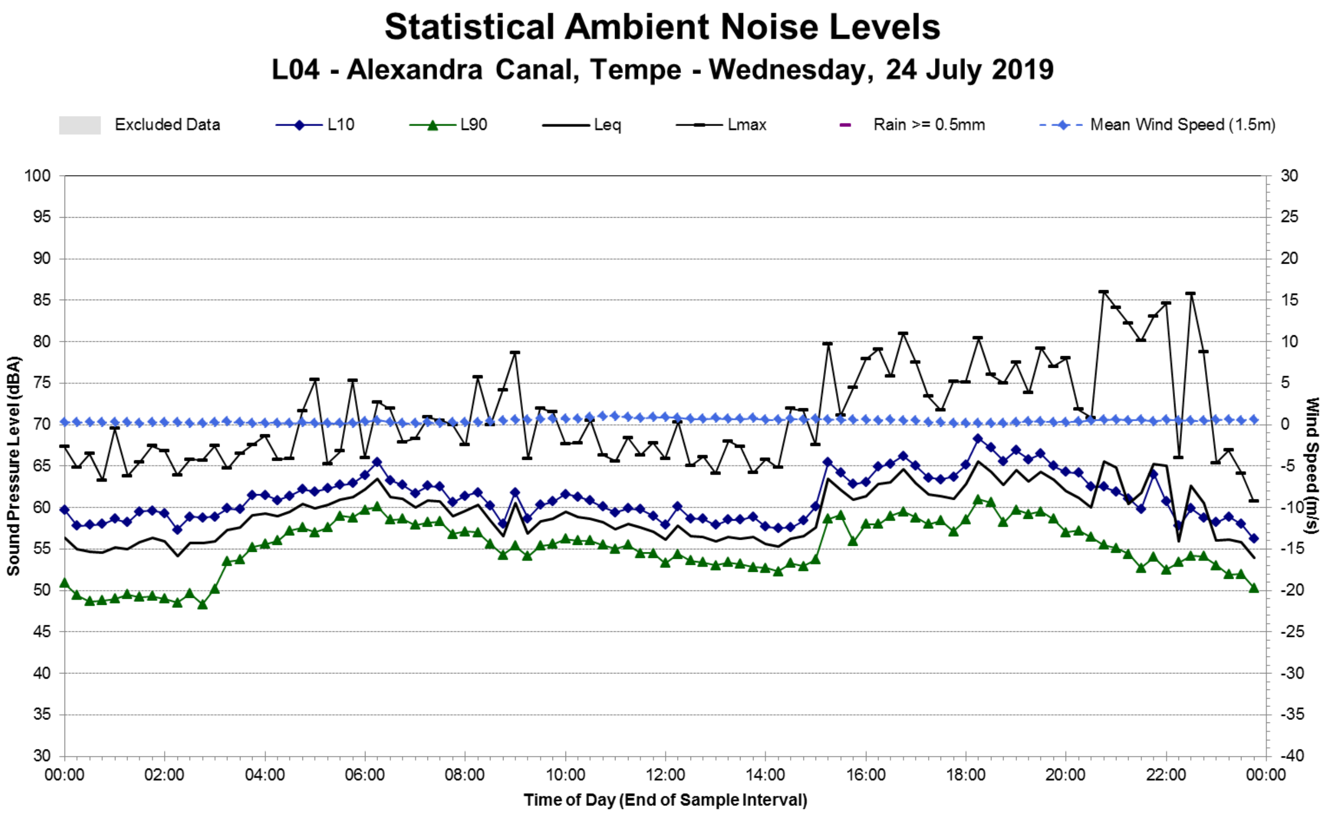
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Saturday, 10 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

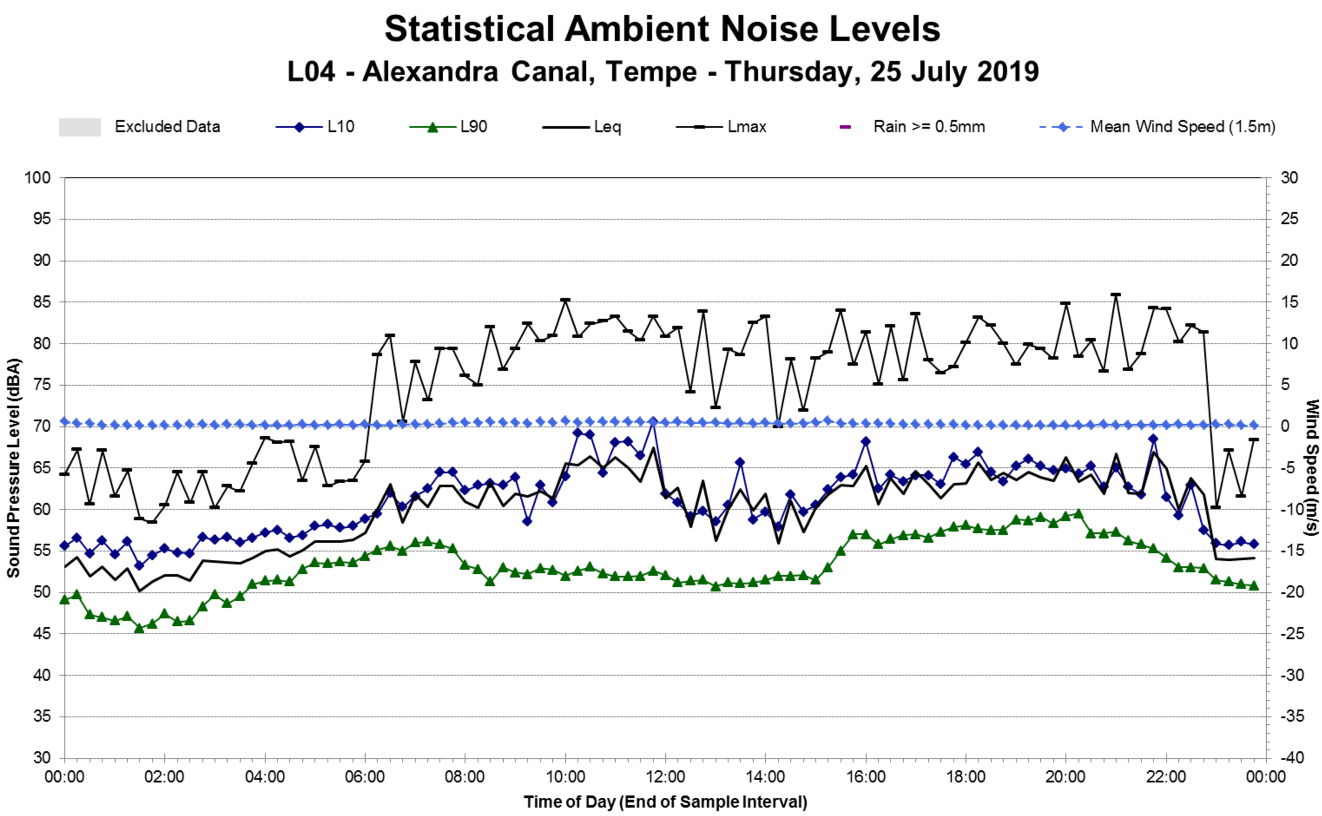


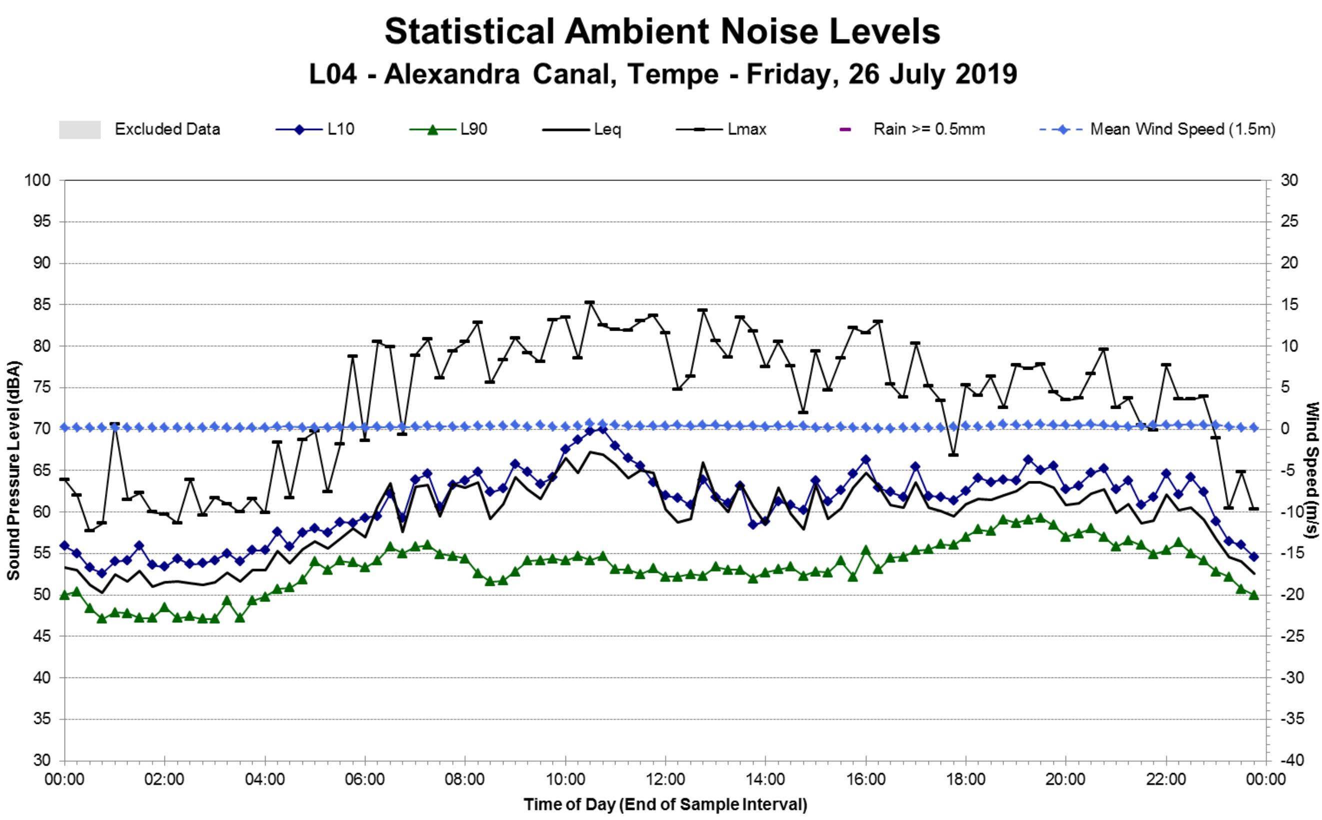
Statistical Ambient Noise Levels
L03 - 1 Fanning Street, Tempe - Sunday, 11 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

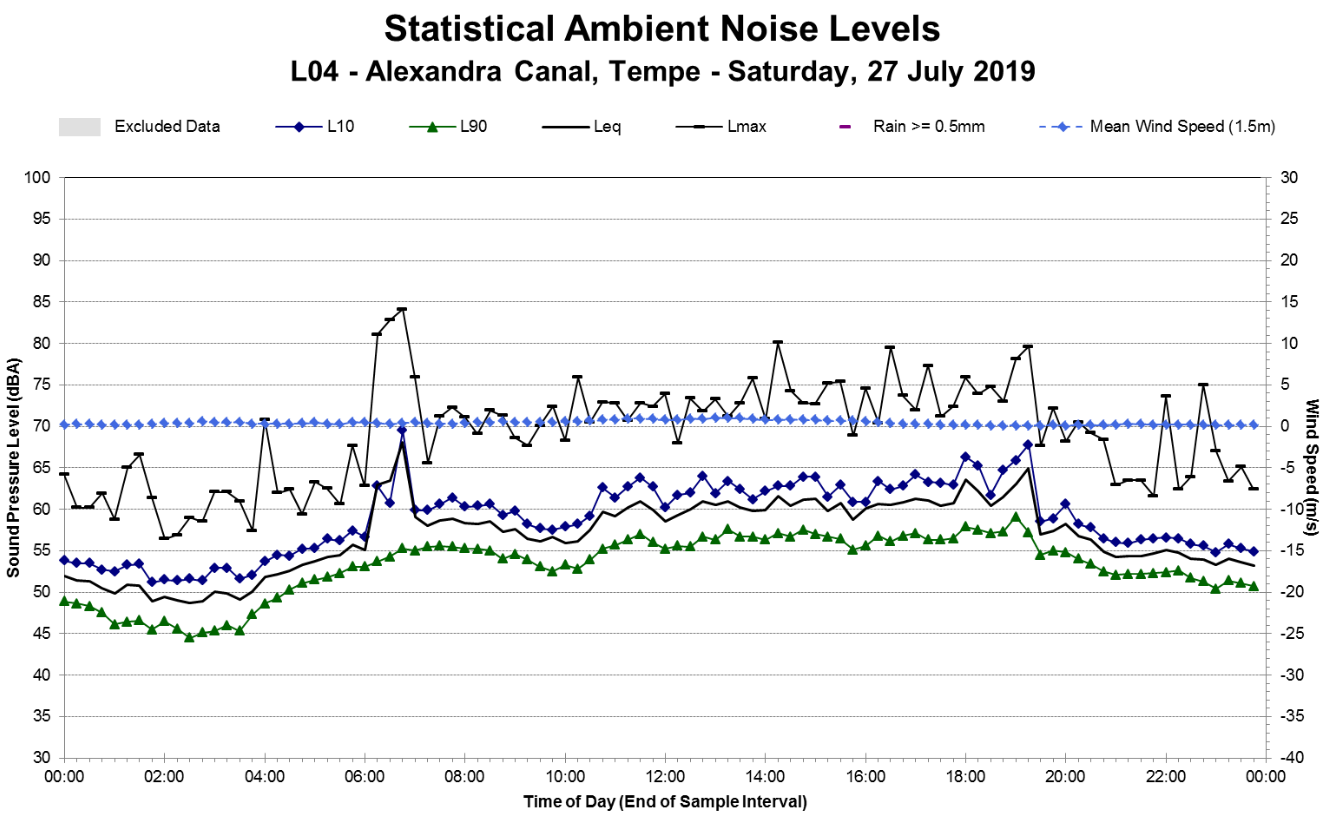

Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Monday, 22 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Tuesday, 23 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Wednesday, 24 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

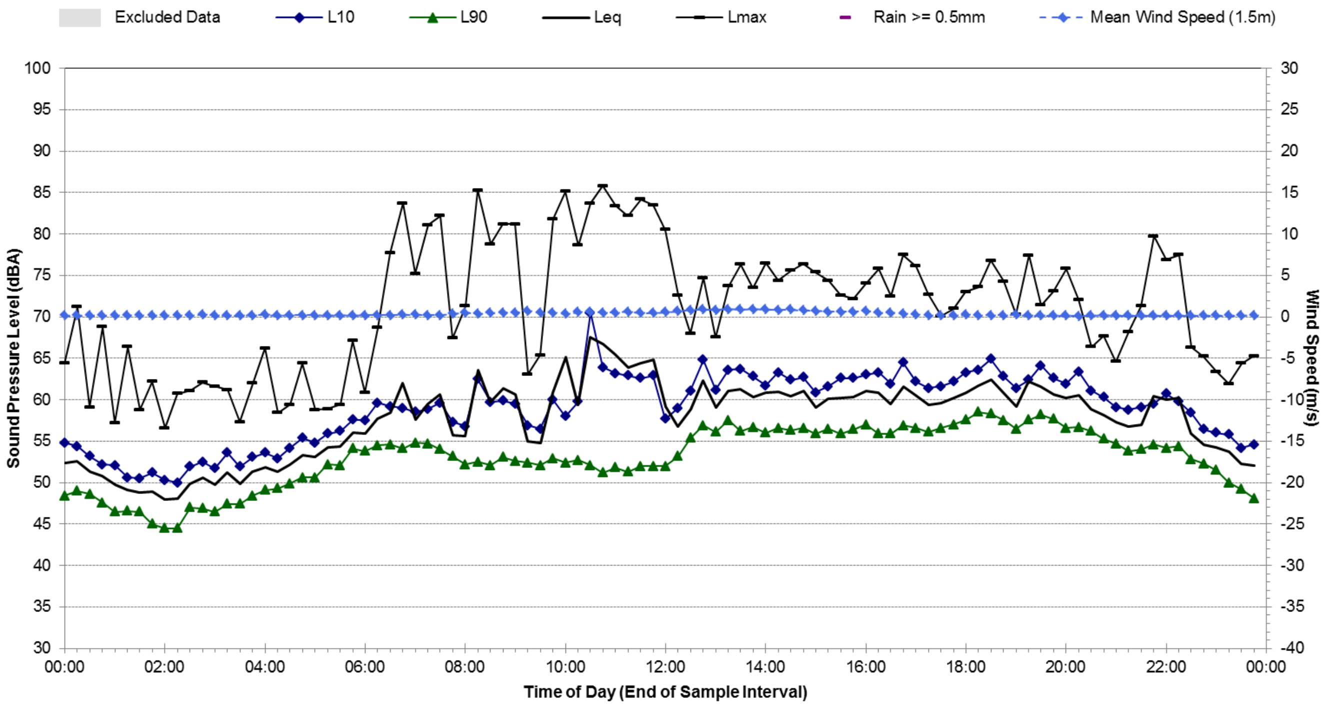

Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Friday, 26 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Saturday, 27 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

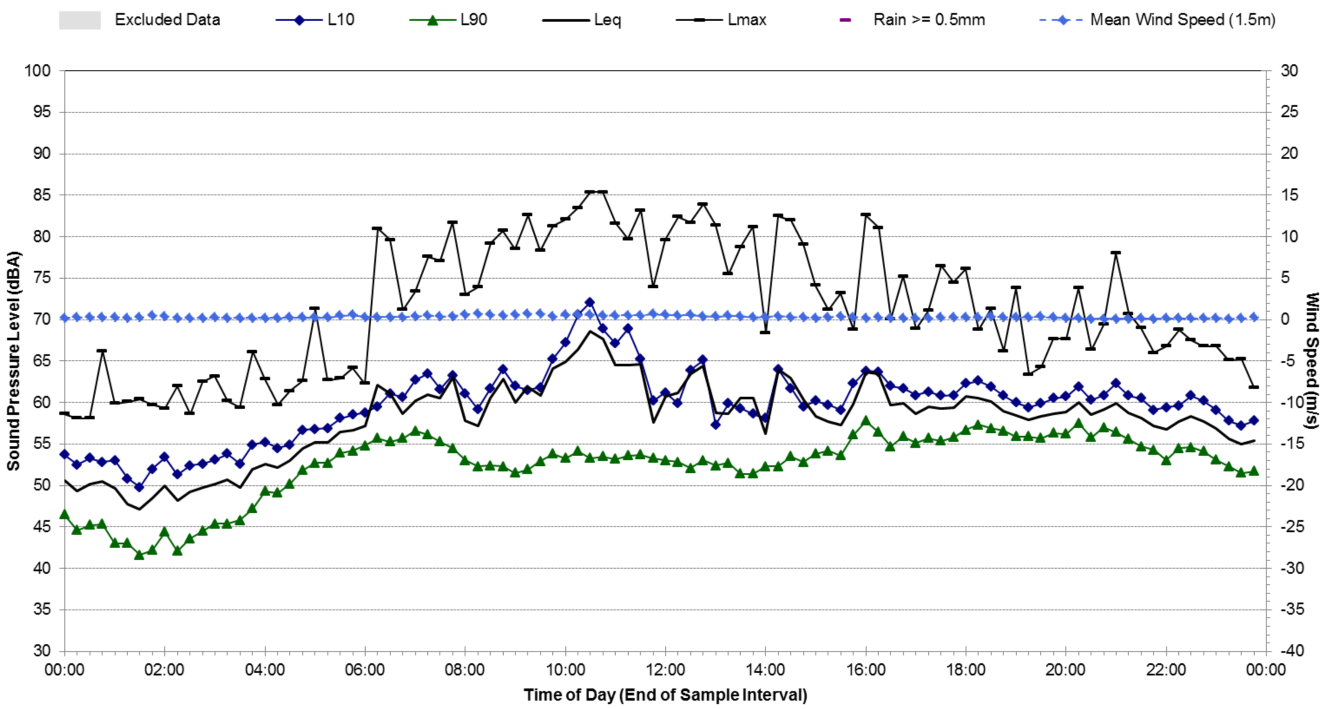
Statistical Ambient Noise Levels

L04 - Alexandra Canal, Tempe - Sunday, 28 July 2019



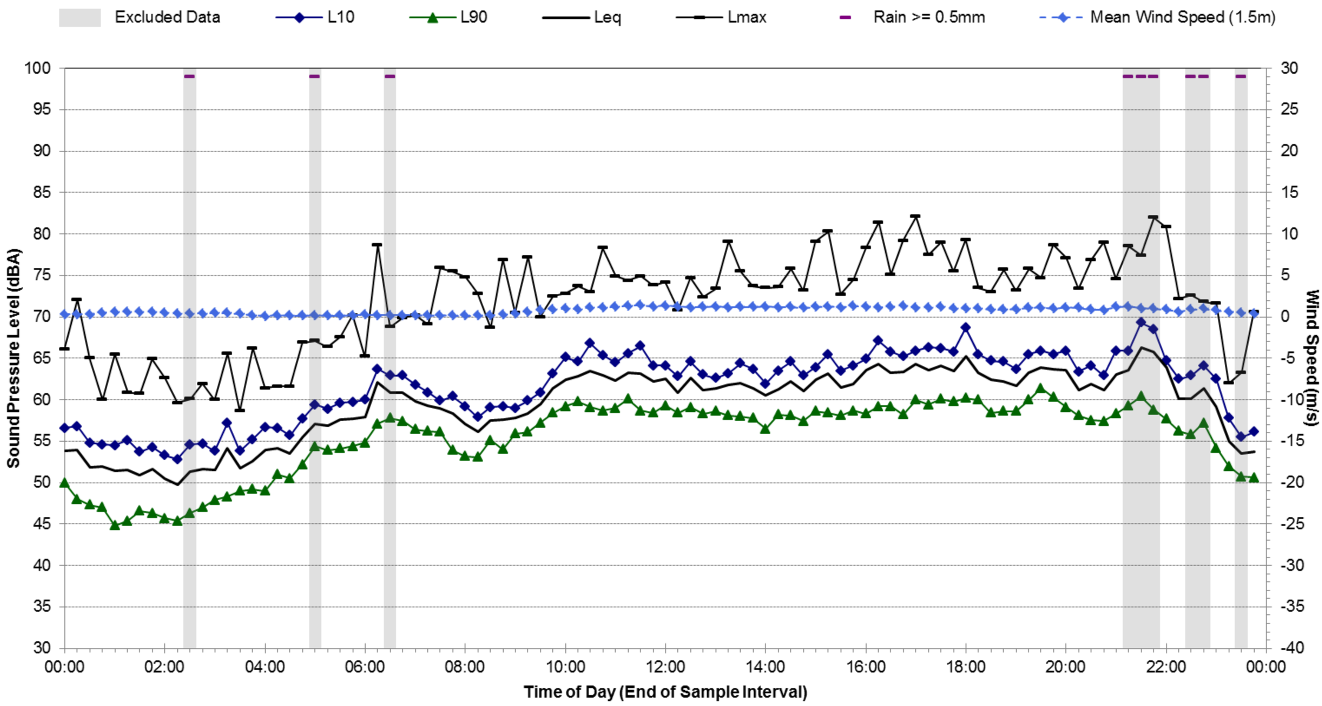
Statistical Ambient Noise Levels

L04 - Alexandra Canal, Tempe - Monday, 29 July 2019



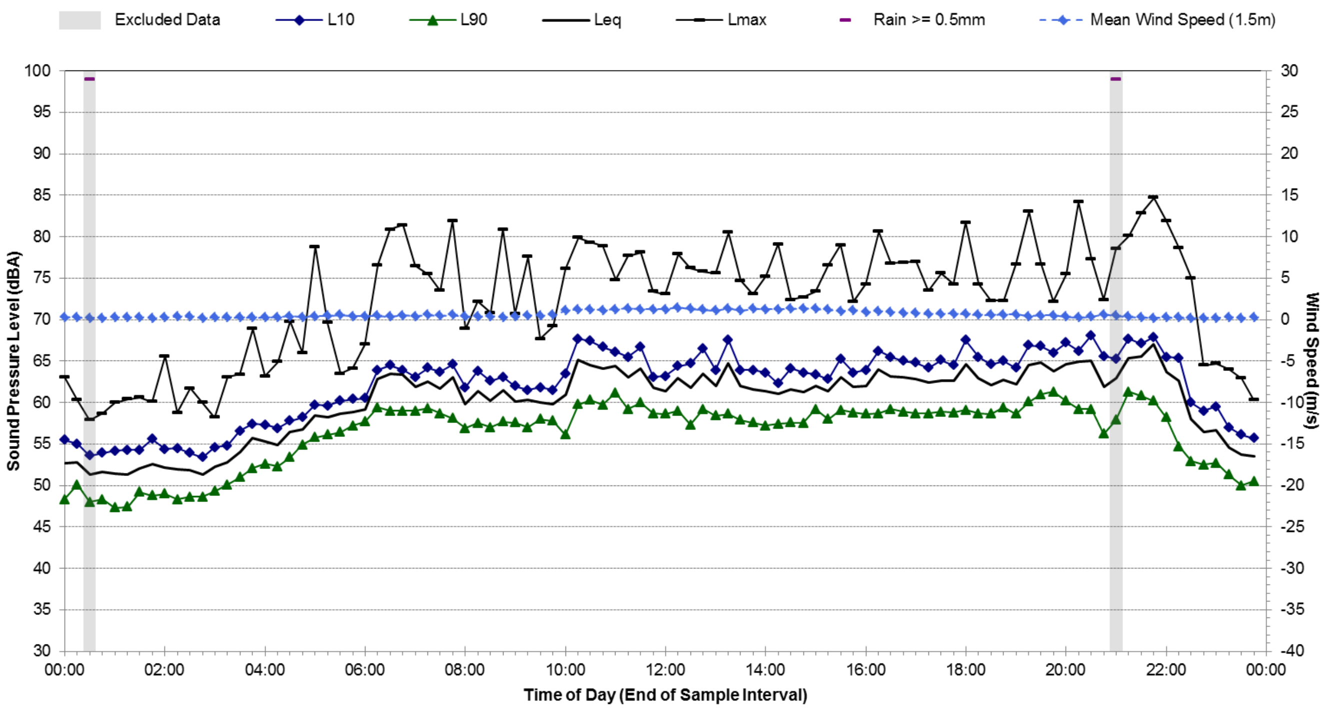
Statistical Ambient Noise Levels

L04 - Alexandra Canal, Tempe - Tuesday, 30 July 2019

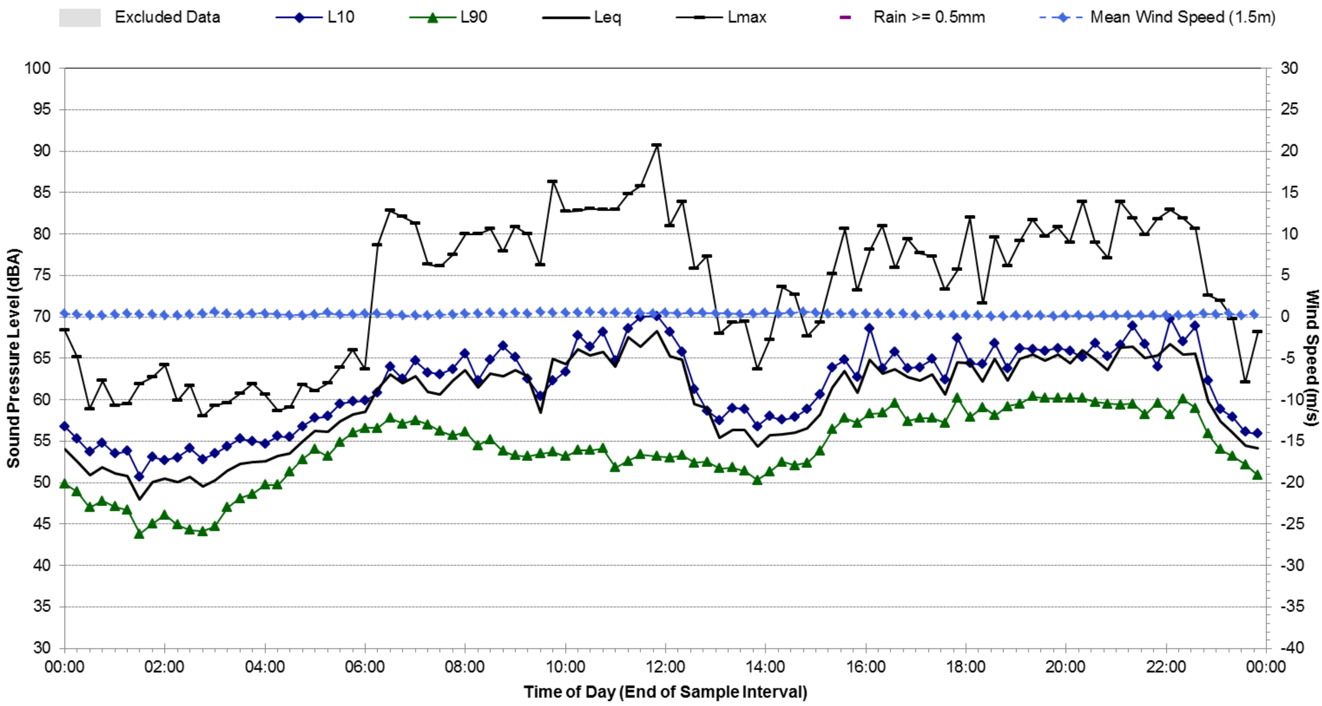


Statistical Ambient Noise Levels

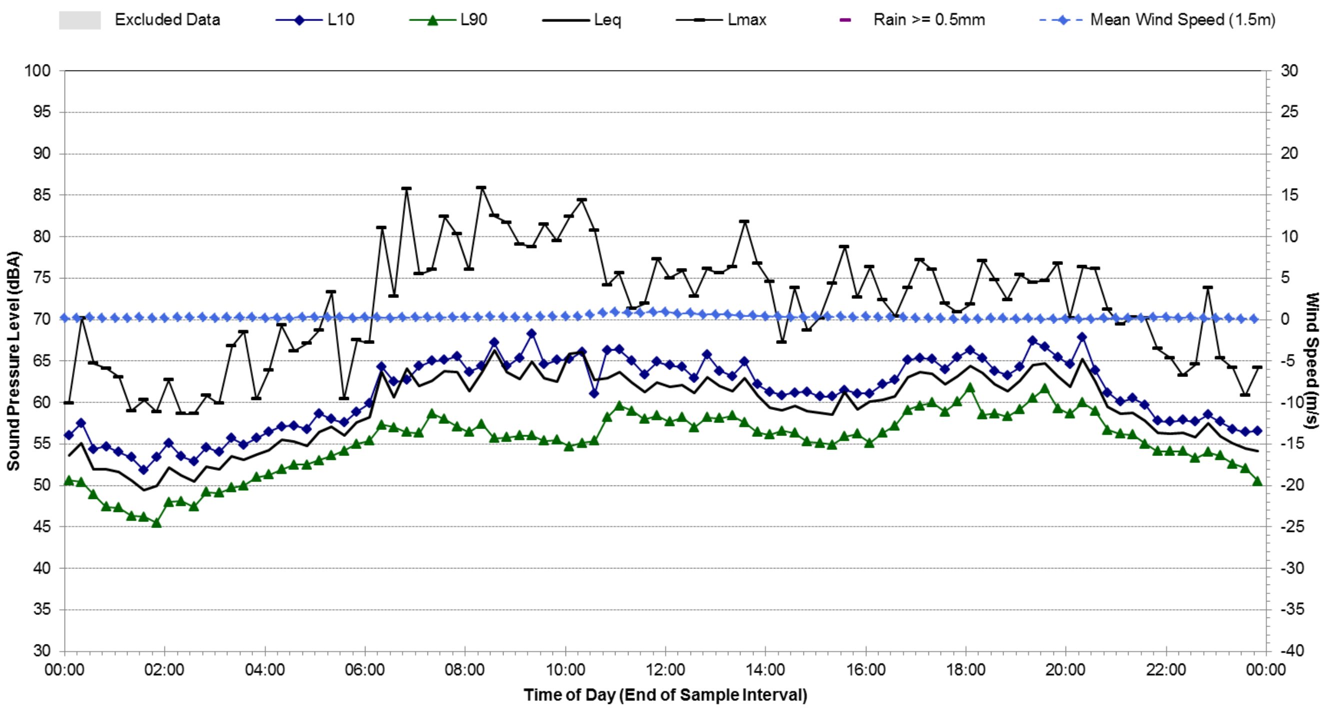
L04 - Alexandra Canal, Tempe - Wednesday, 31 July 2019



Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Thursday, 1 August 2019

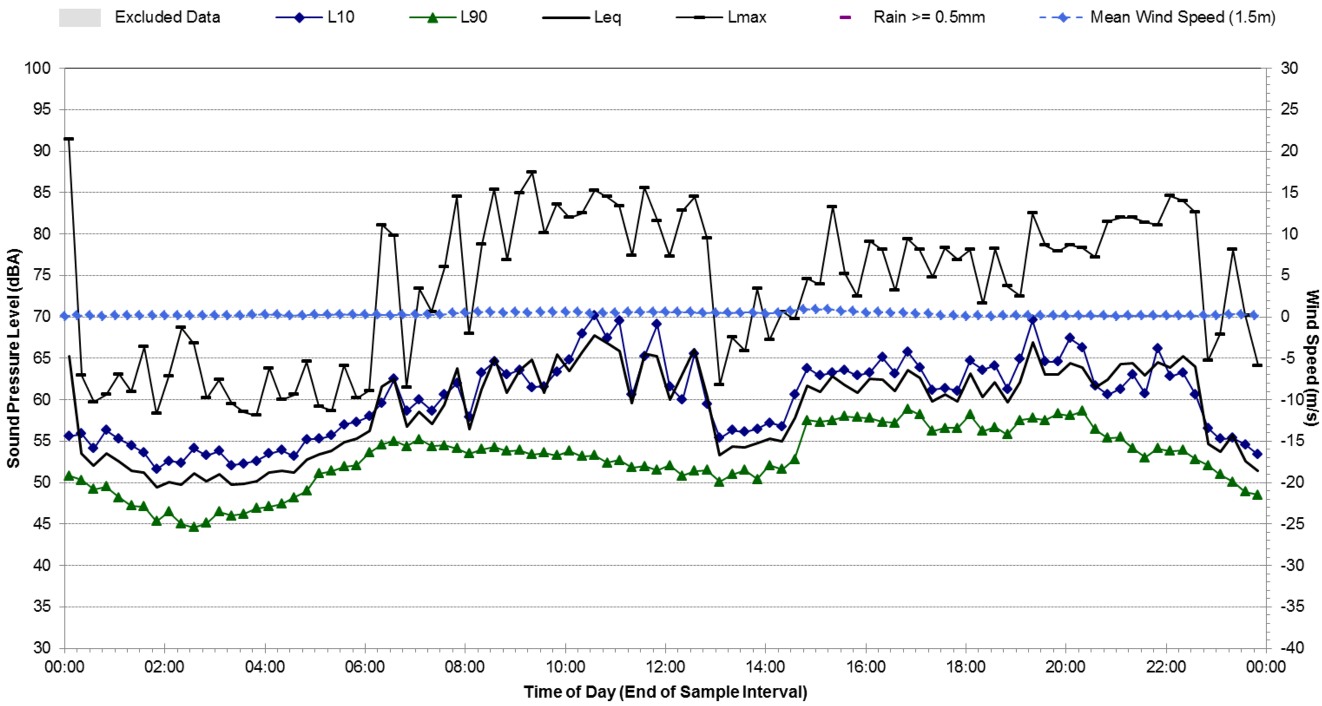


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Friday, 2 August 2019



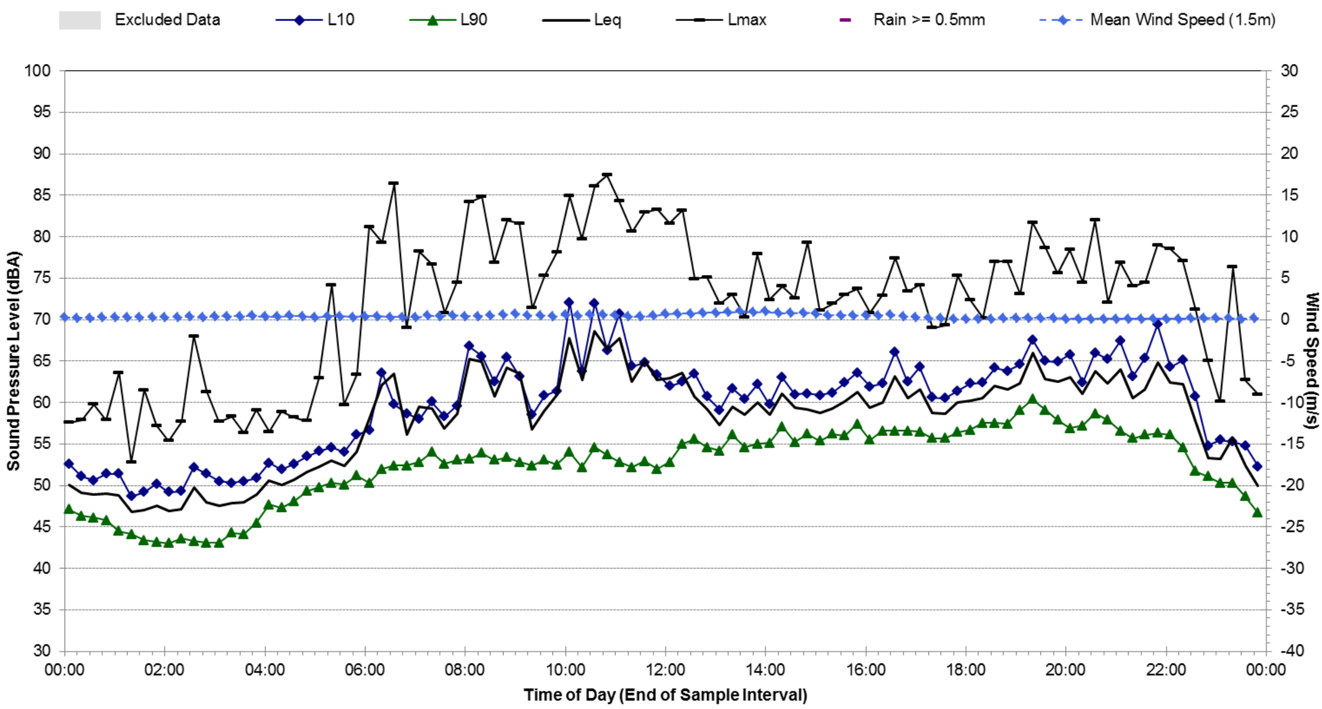
Statistical Ambient Noise Levels

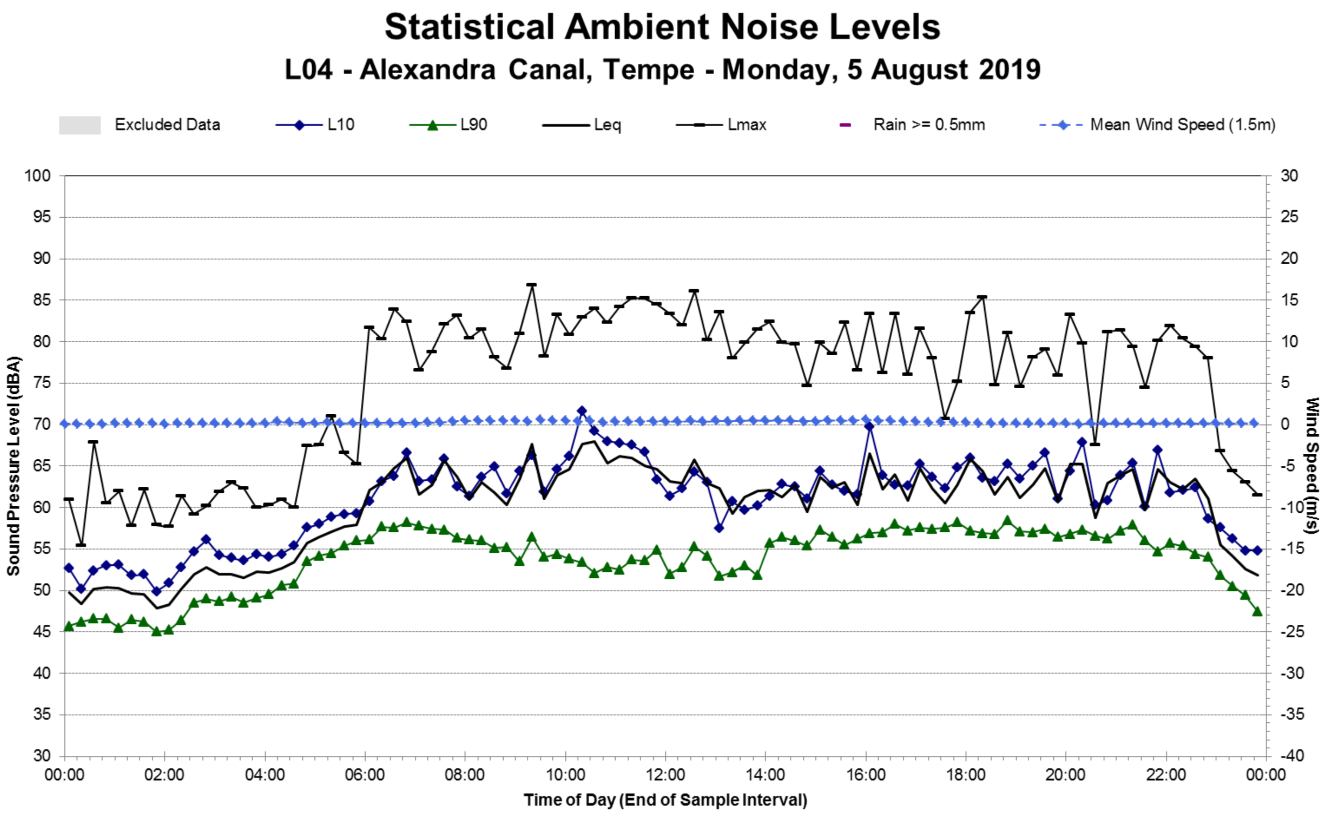
L04 - Alexandra Canal, Tempe - Saturday, 3 August 2019

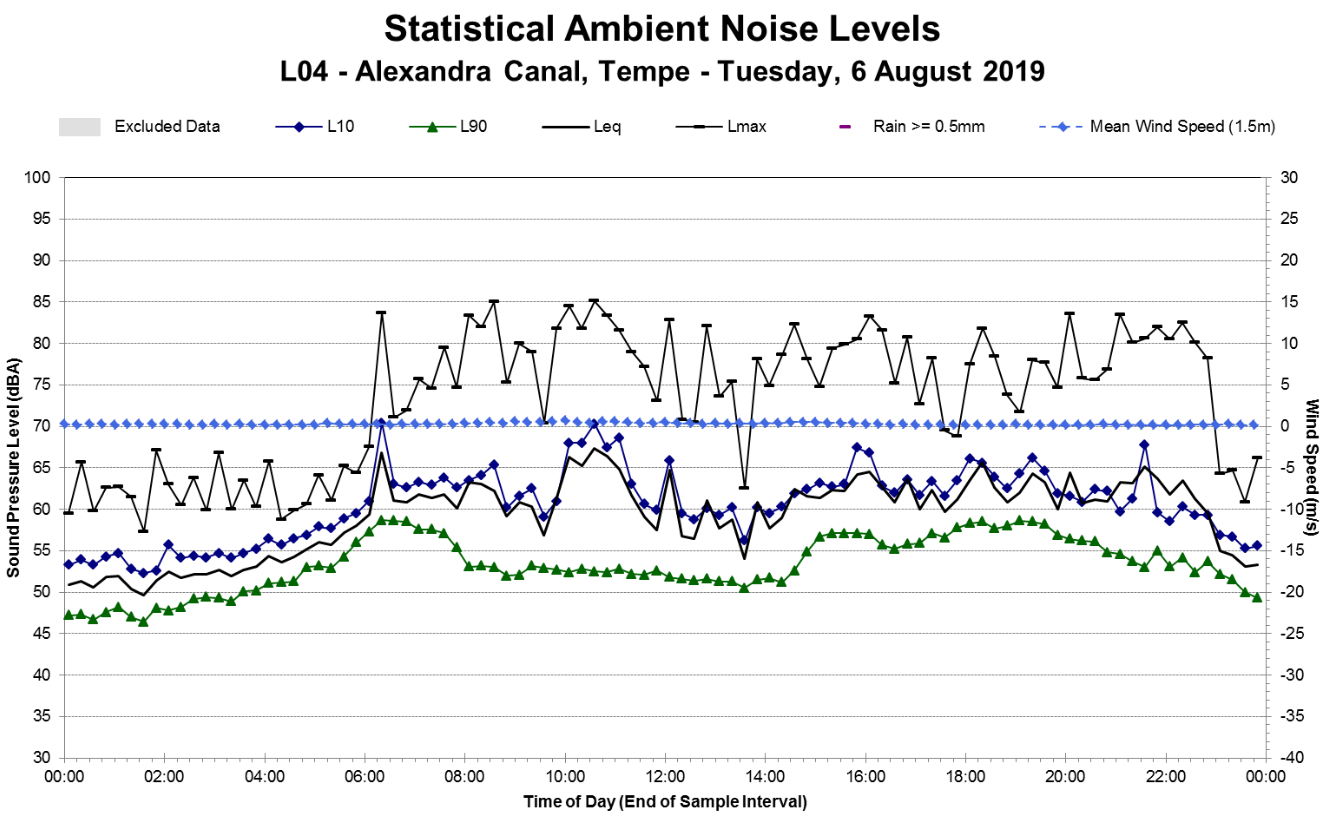


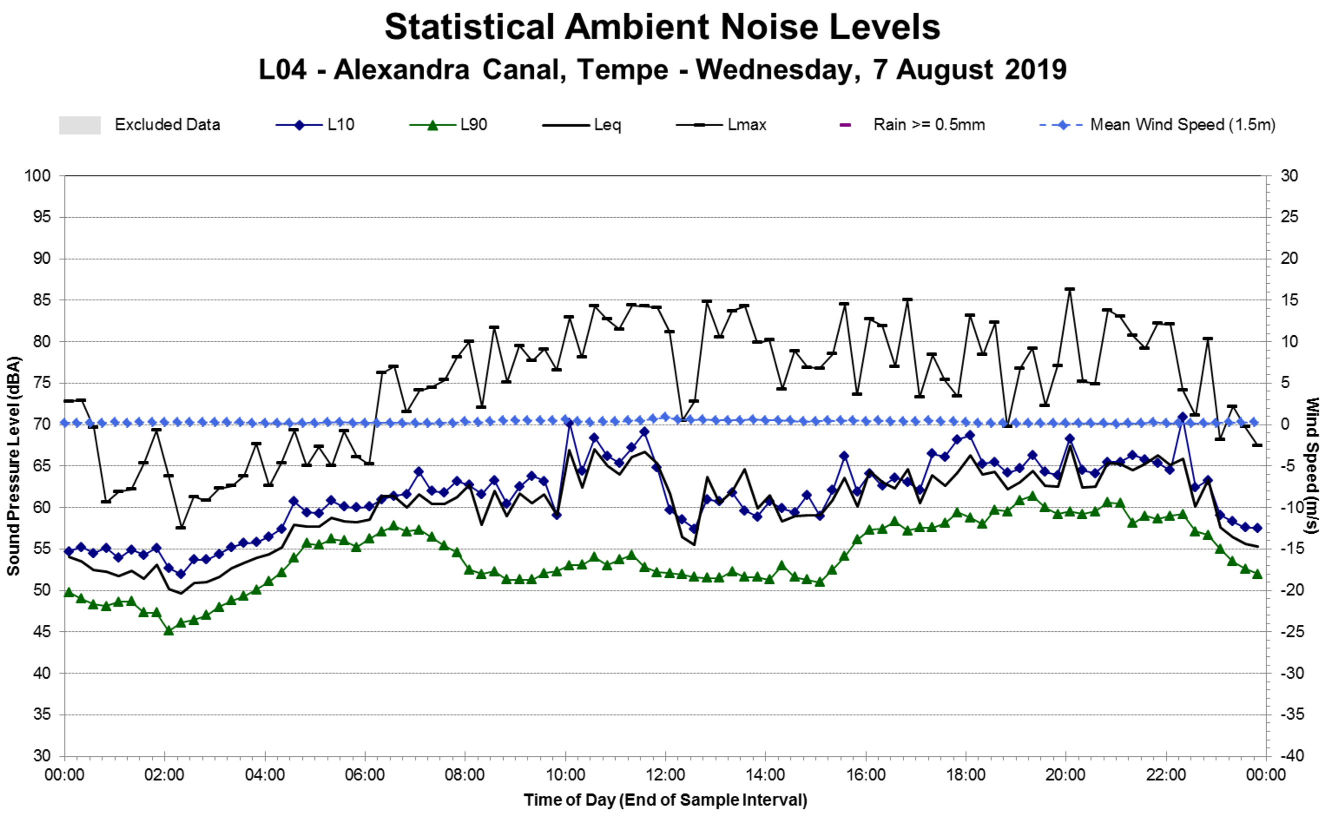
Statistical Ambient Noise Levels

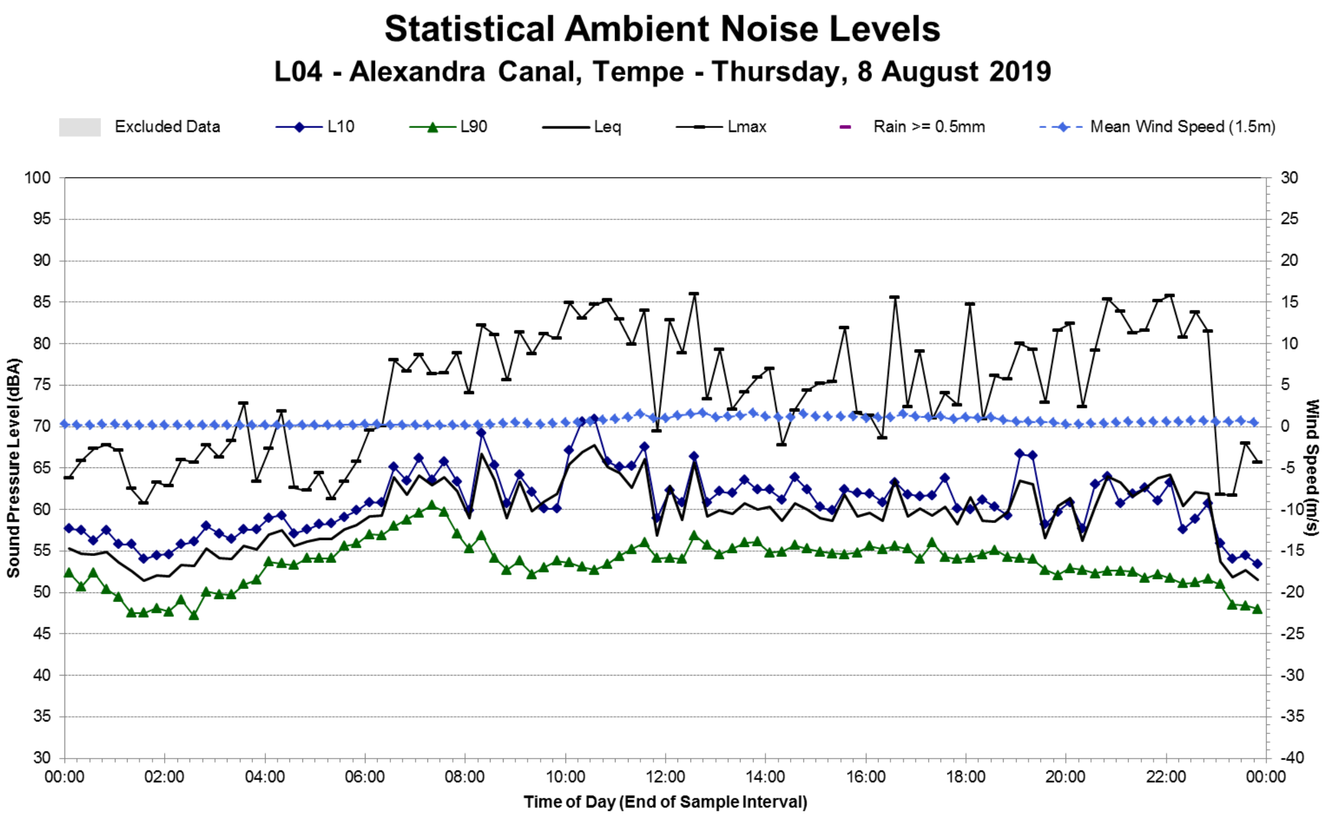
L04 - Alexandra Canal, Tempe - Sunday, 4 August 2019




Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Monday, 5 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

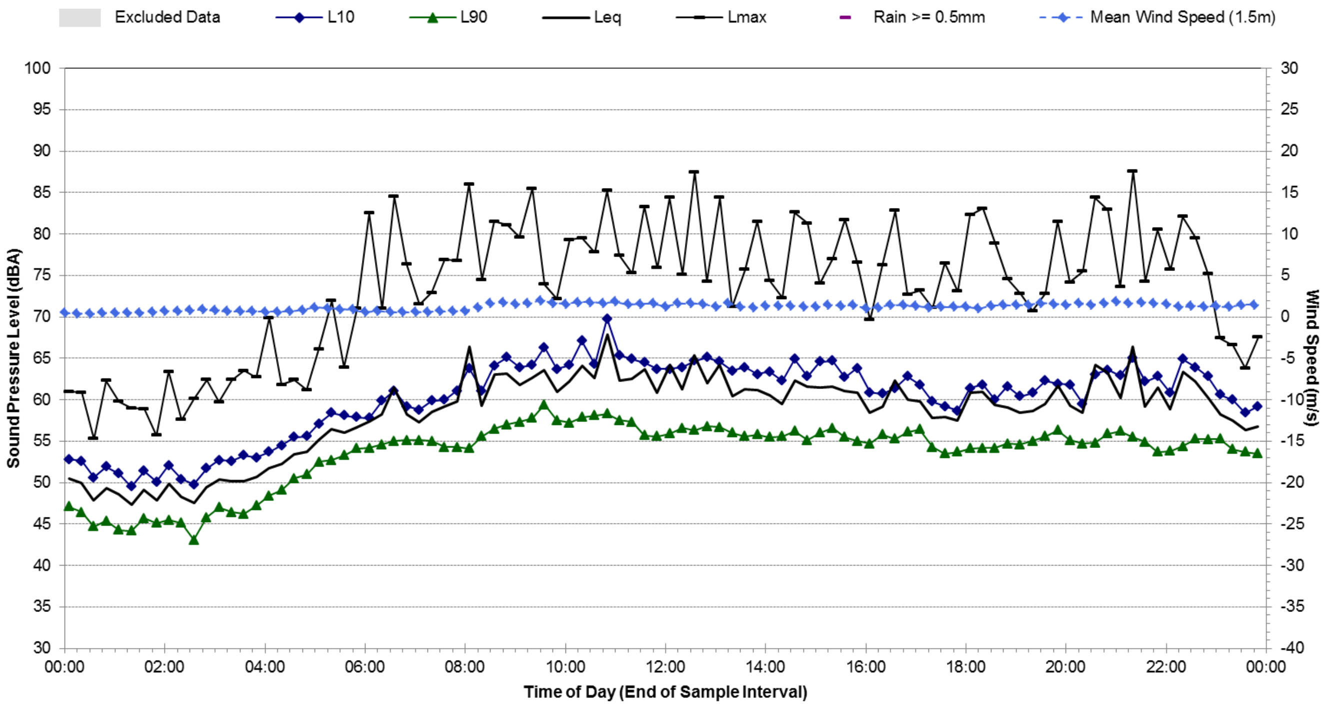

Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Tuesday, 6 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Wednesday, 7 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Thursday, 8 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

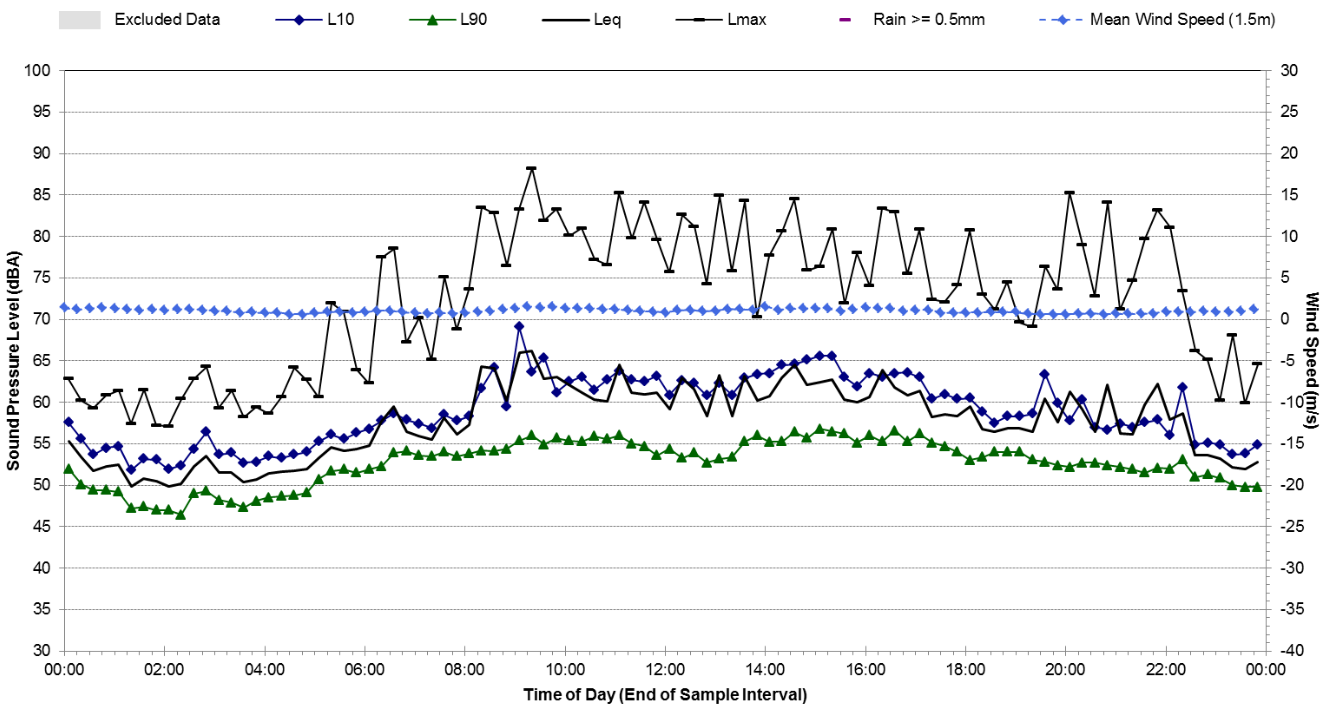
Statistical Ambient Noise Levels

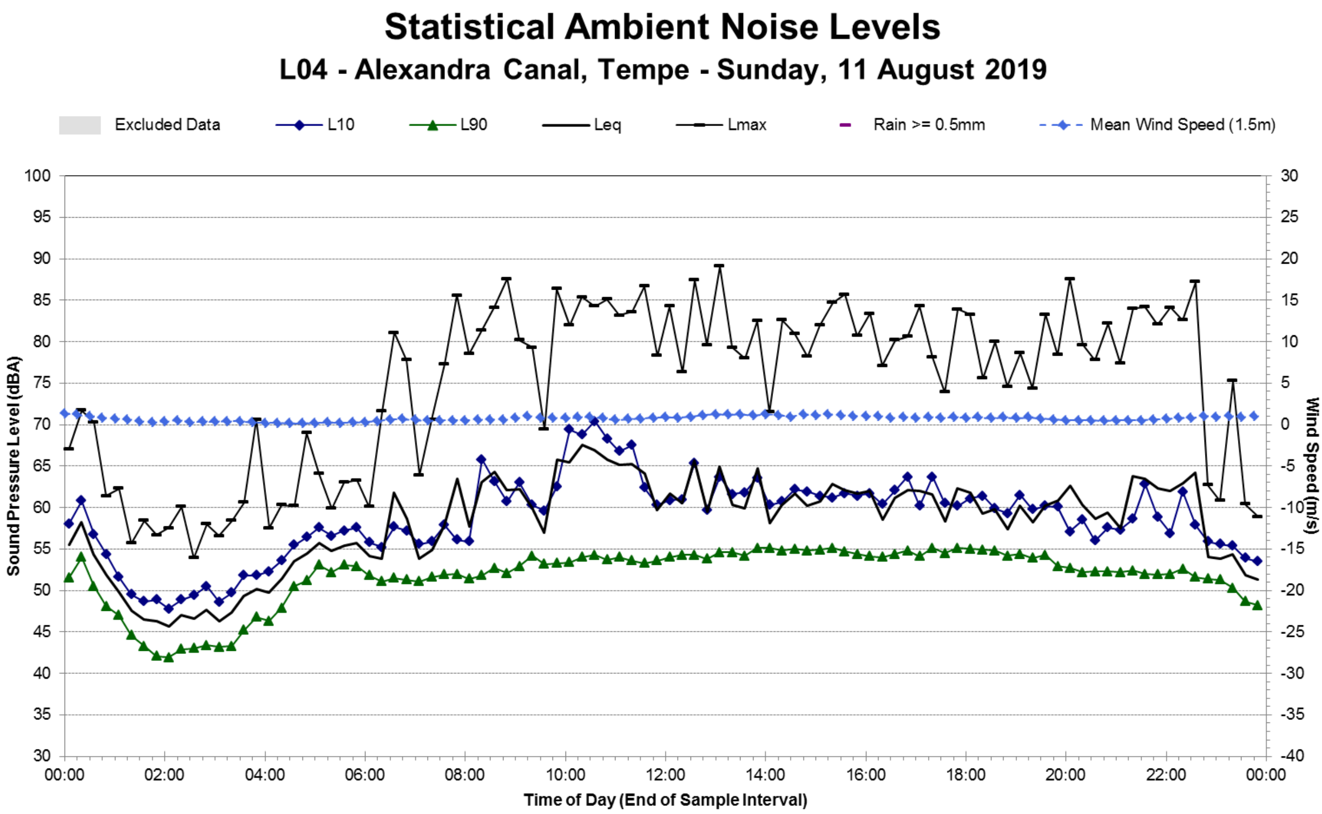
L04 - Alexandra Canal, Tempe - Friday, 9 August 2019



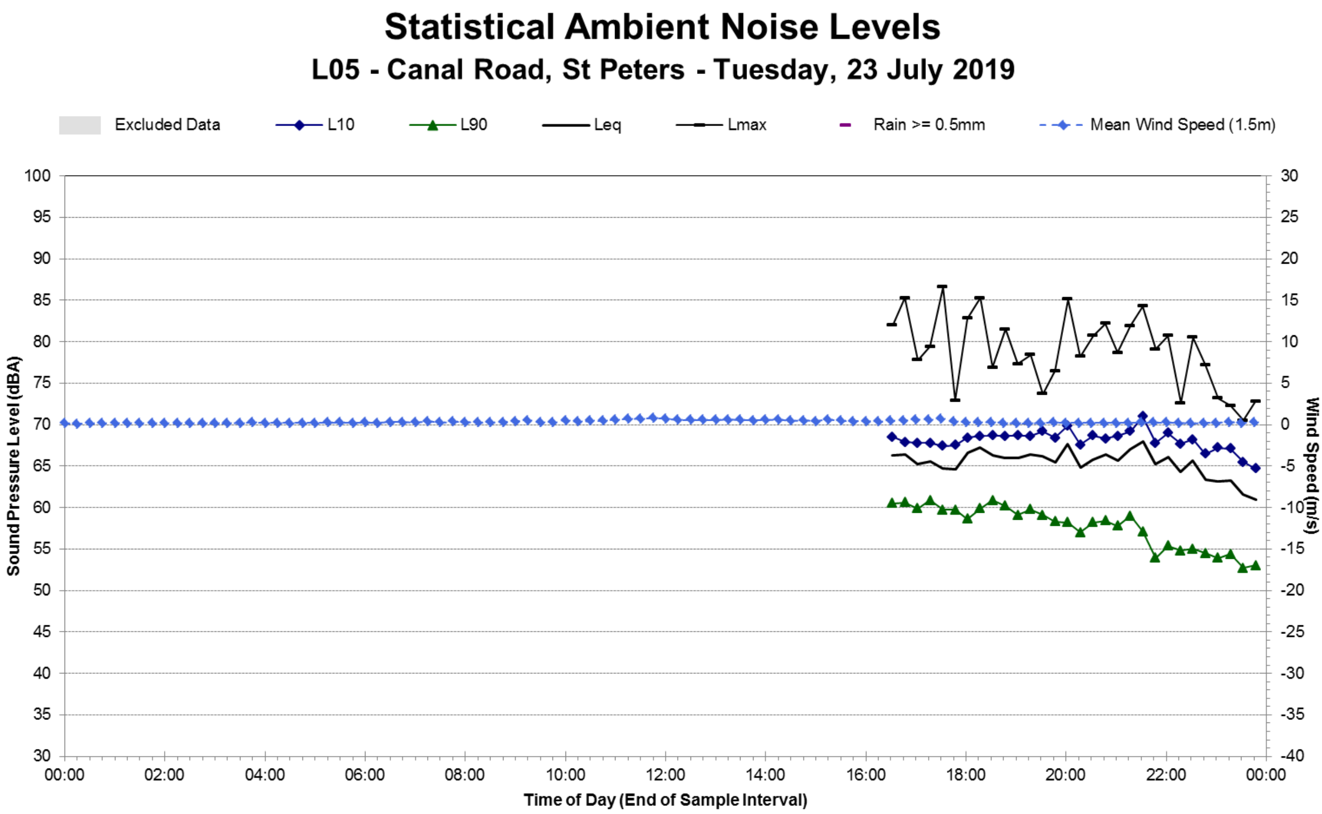
Statistical Ambient Noise Levels

L04 - Alexandra Canal, Tempe - Saturday, 10 August 2019

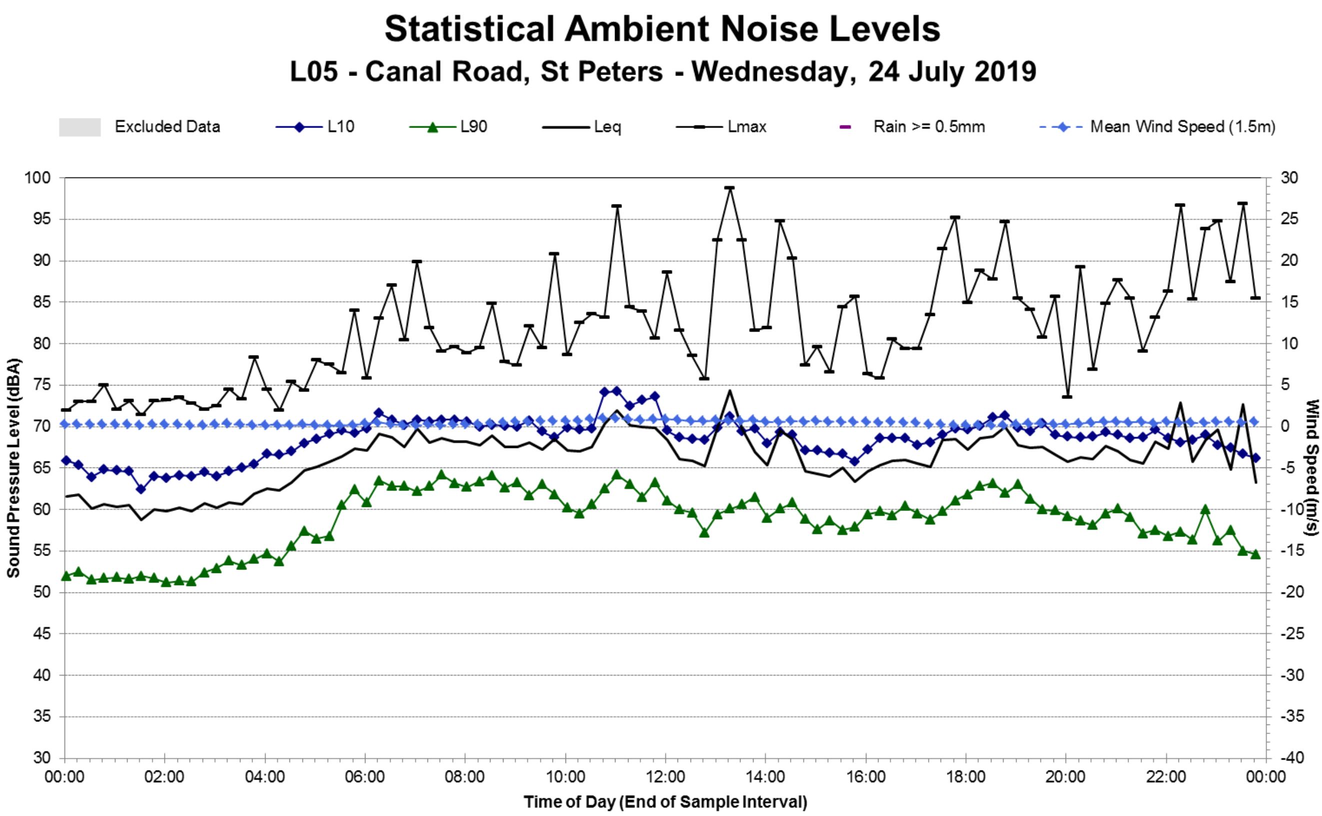




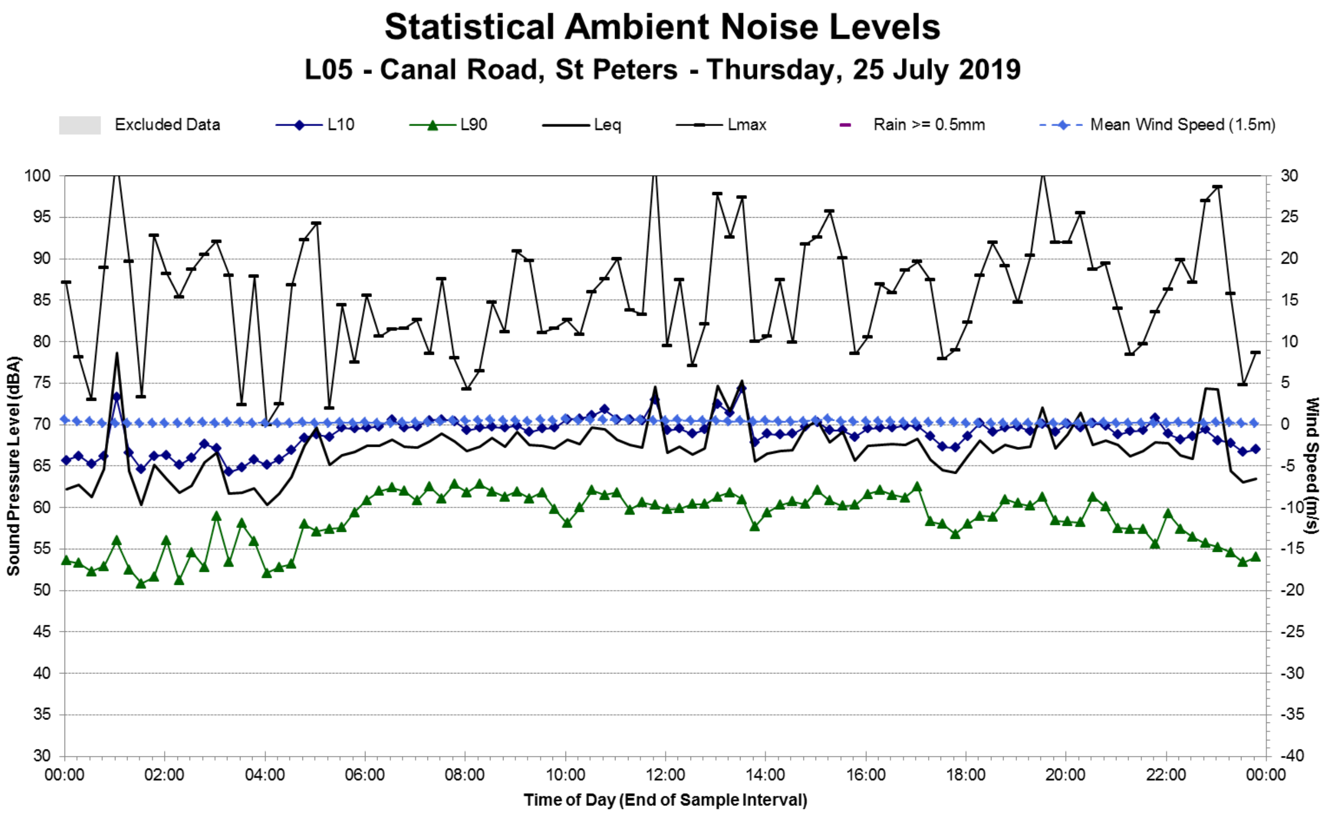
Statistical Ambient Noise Levels
L04 - Alexandra Canal, Tempe - Sunday, 11 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

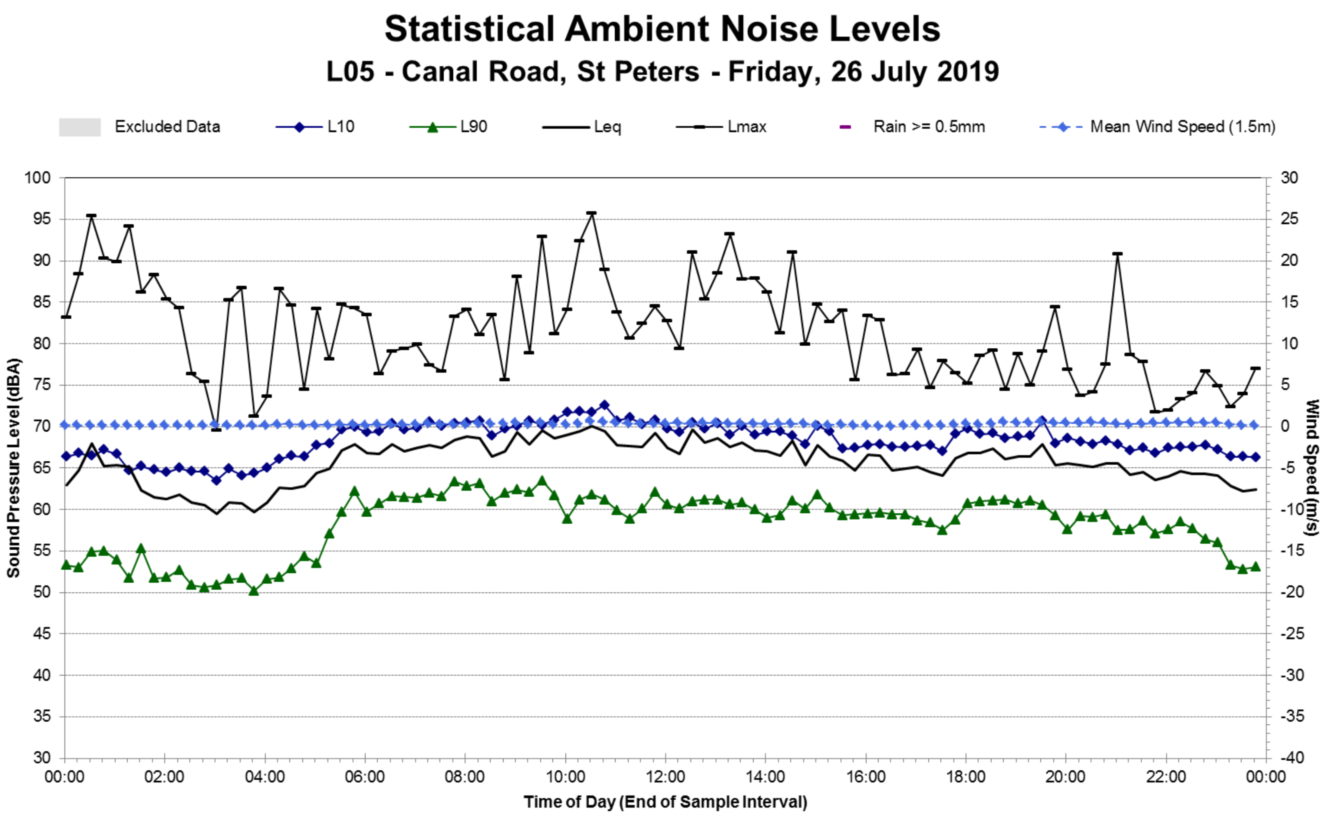


Statistical Ambient Noise Levels
L05 - Canal Road, St Peters - Tuesday, 23 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

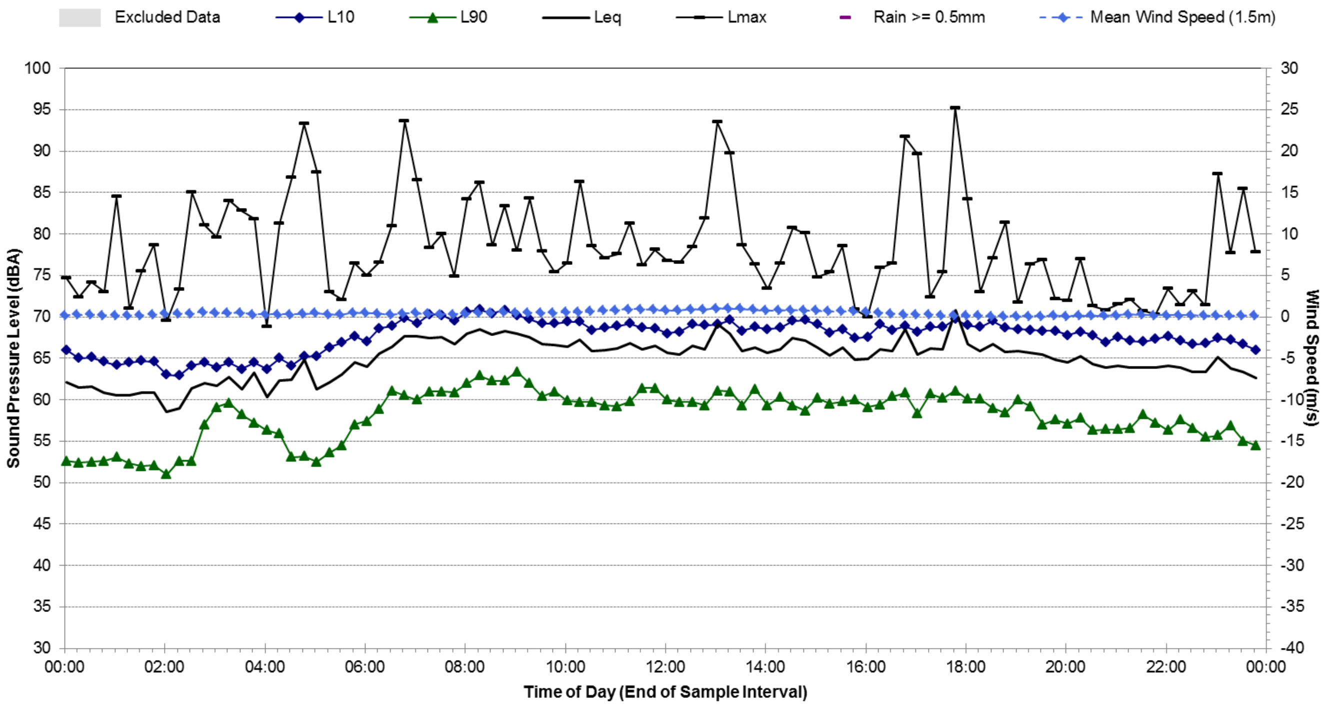


Statistical Ambient Noise Levels
L05 - Canal Road, St Peters - Wednesday, 24 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

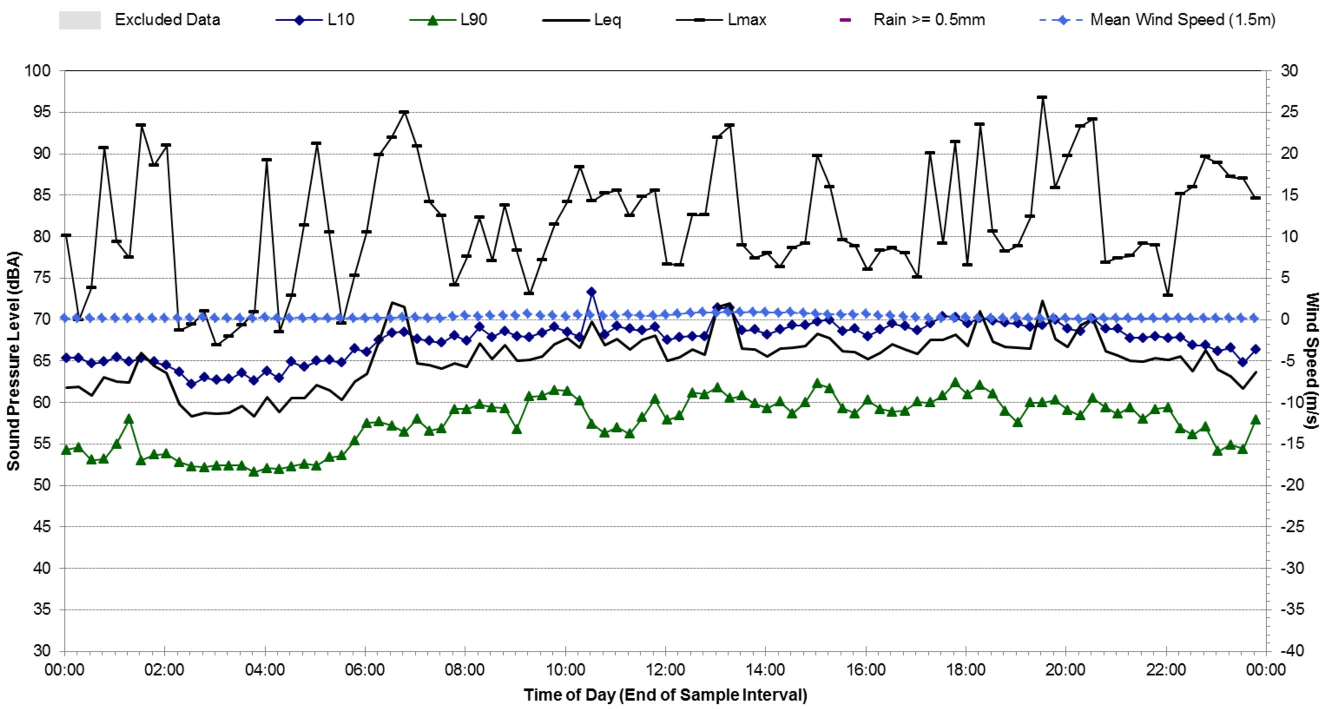

Statistical Ambient Noise Levels
L05 - Canal Road, St Peters - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L05 - Canal Road, St Peters - Friday, 26 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

Statistical Ambient Noise Levels
L05 - Canal Road, St Peters - Saturday, 27 July 2019

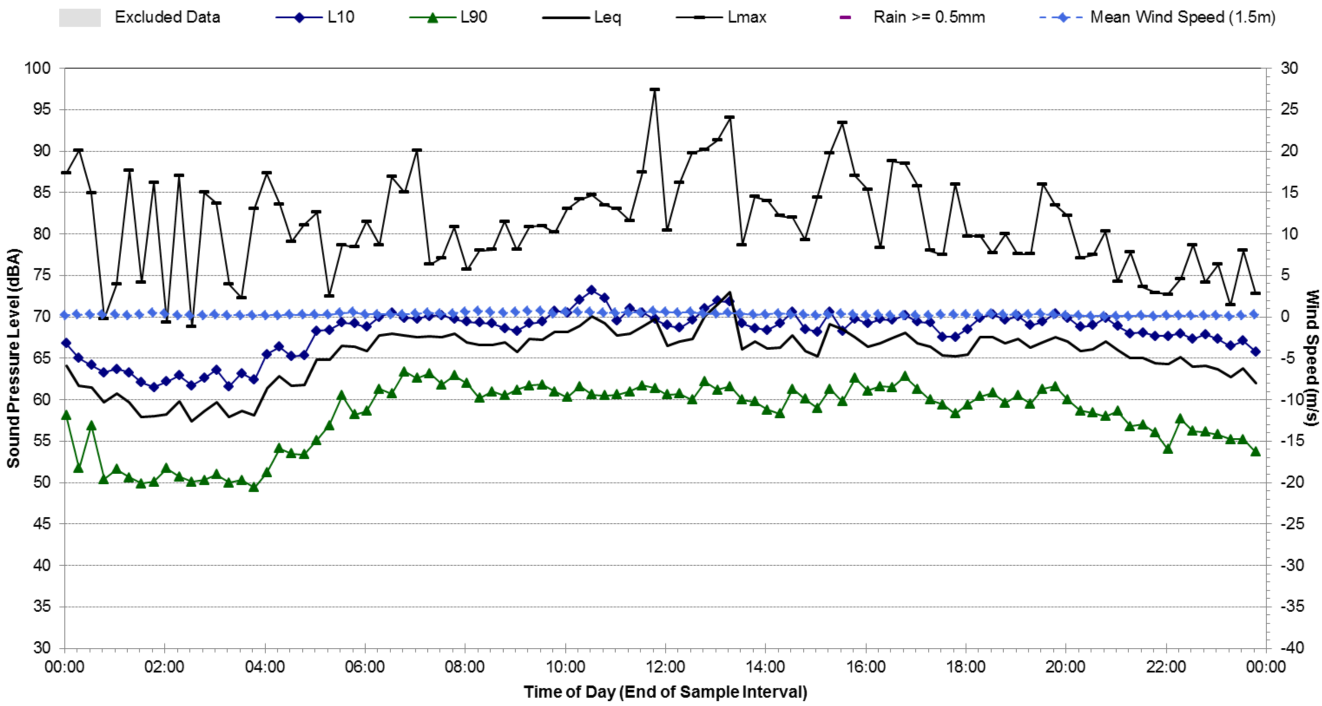


Statistical Ambient Noise Levels
L05 - Canal Road, St Peters - Sunday, 28 July 2019



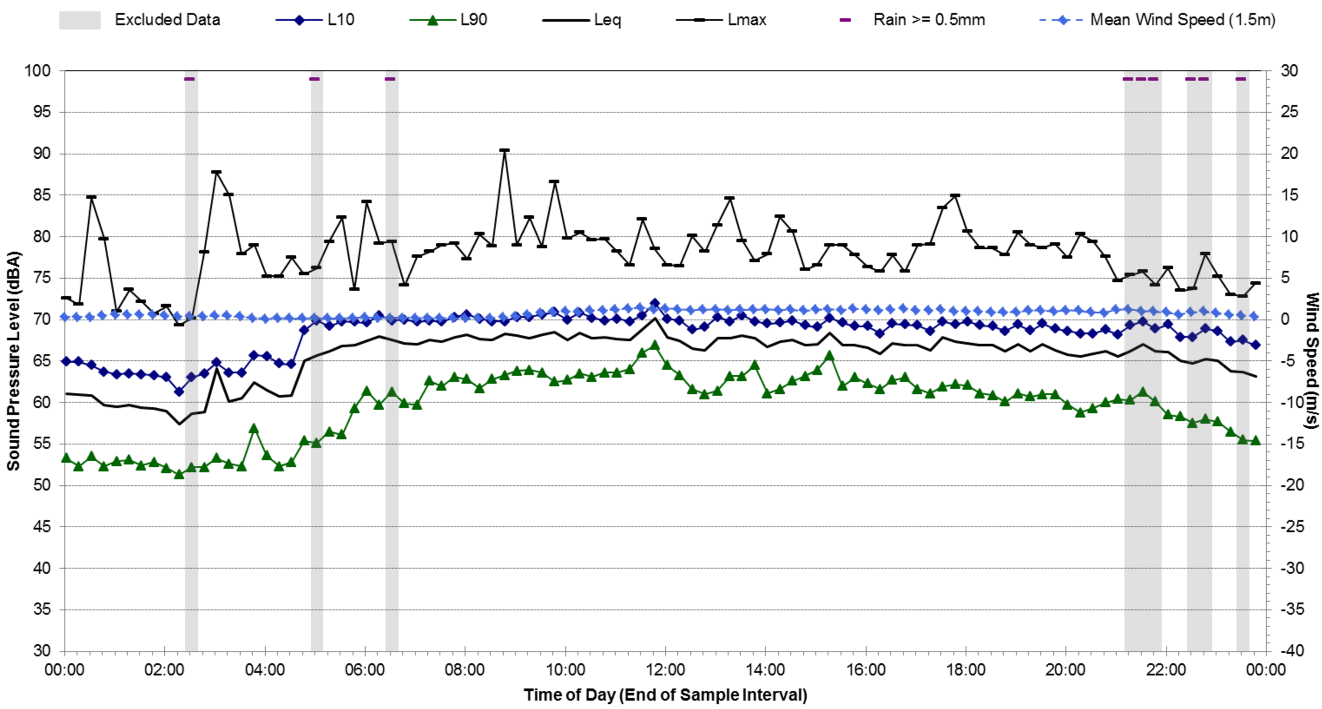
Statistical Ambient Noise Levels

L05 - Canal Road, St Peters - Monday, 29 July 2019



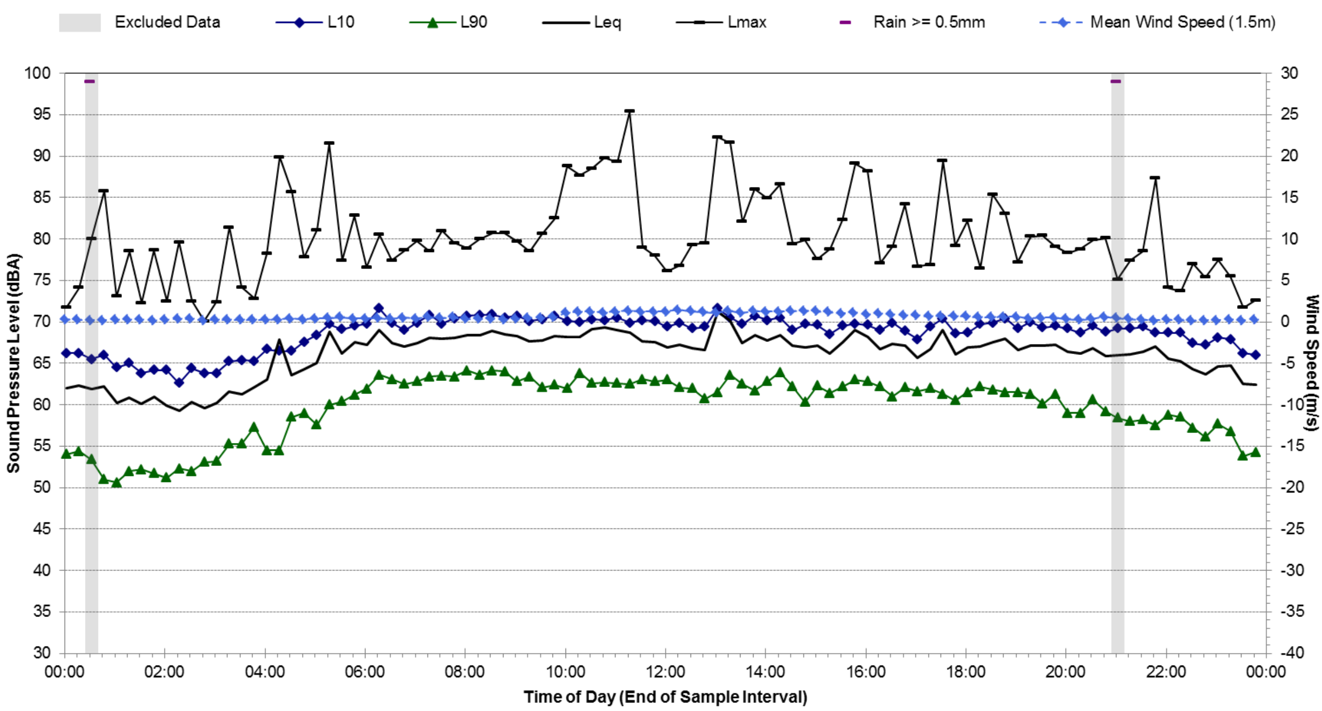
Statistical Ambient Noise Levels

L05 - Canal Road, St Peters - Tuesday, 30 July 2019



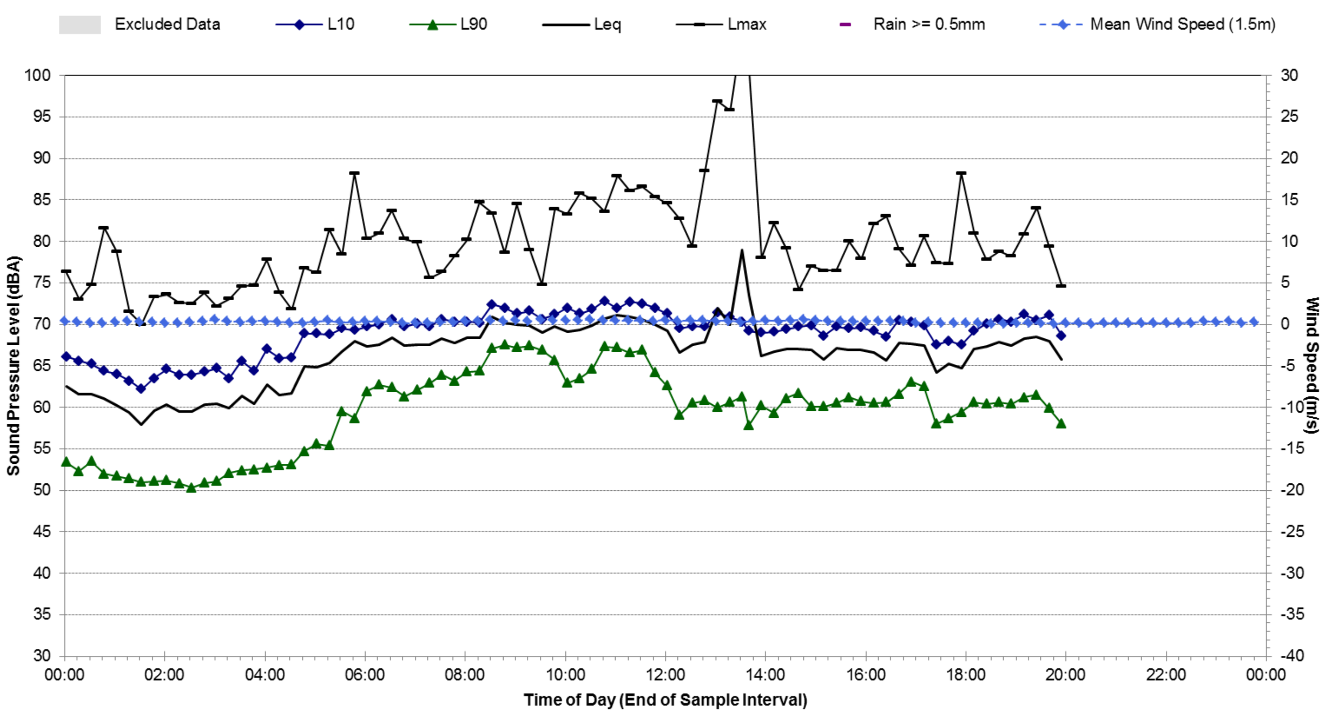
Statistical Ambient Noise Levels

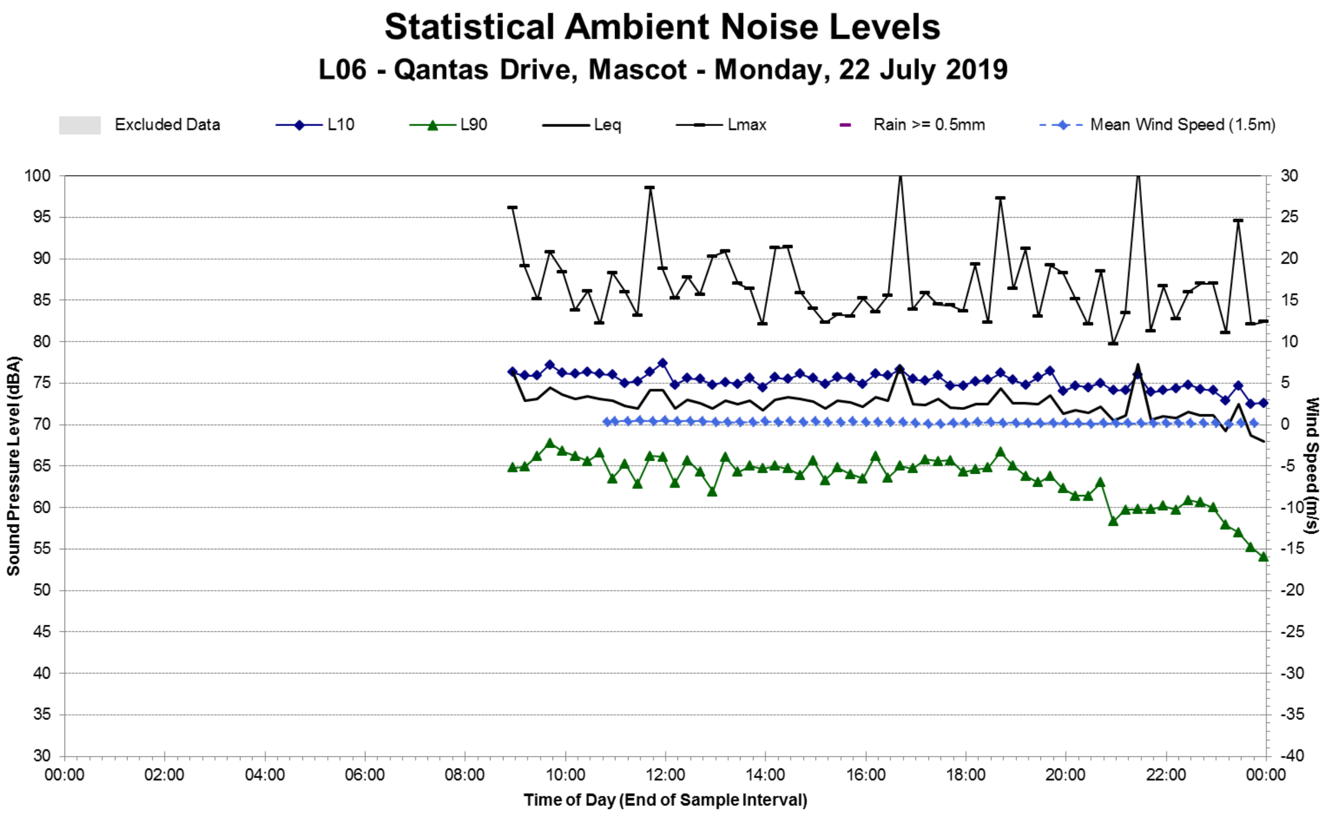
L05 - Canal Road, St Peters - Wednesday, 31 July 2019

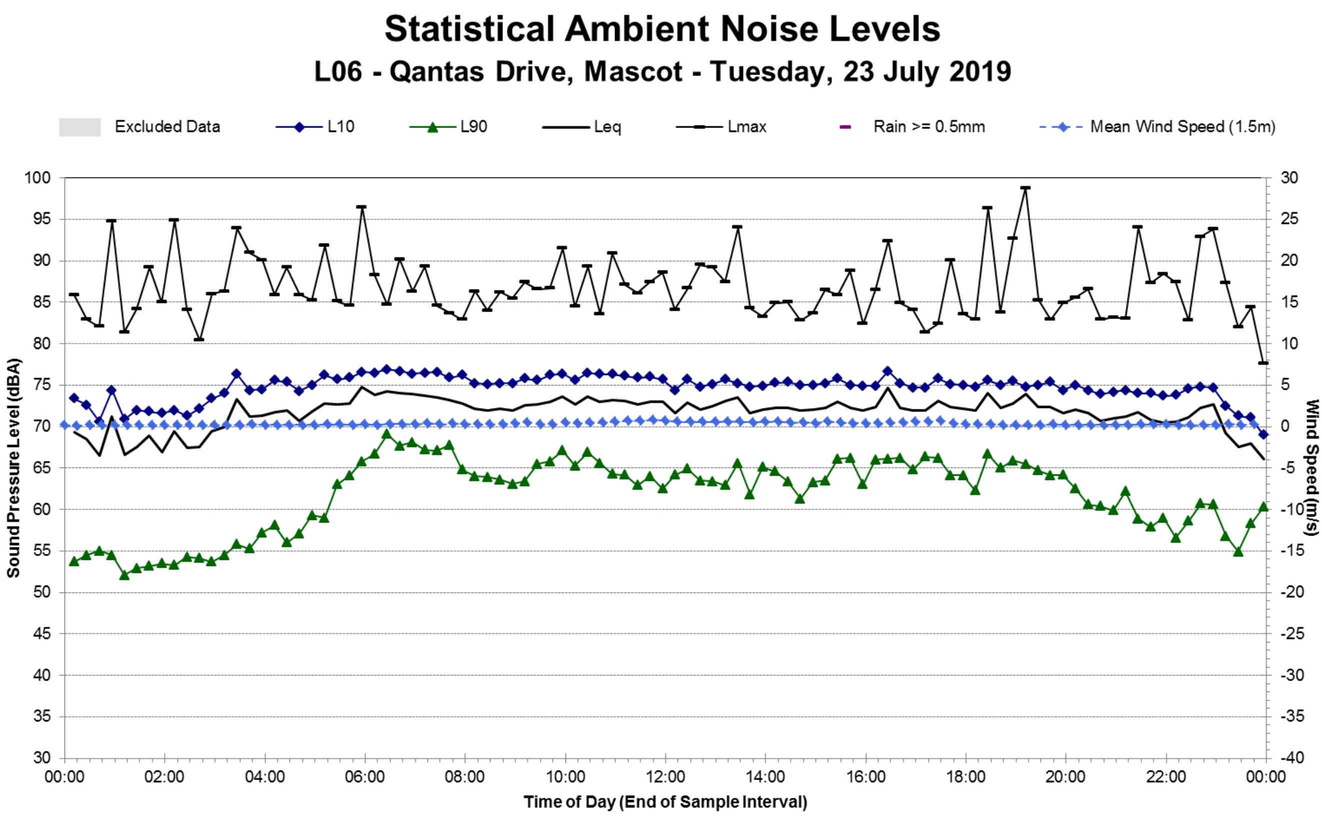


Statistical Ambient Noise Levels

L05 - Canal Road, St Peters - Thursday, 1 August 2019

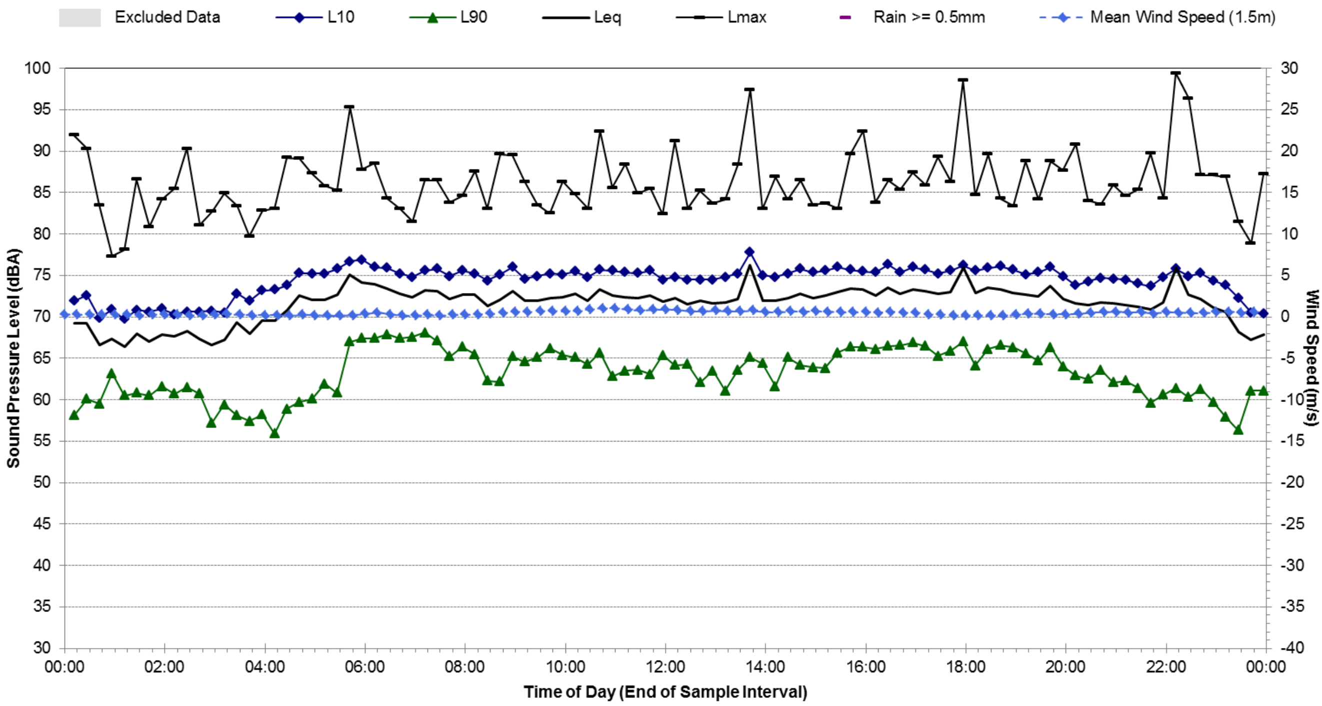



Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Monday, 22 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Tuesday, 23 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

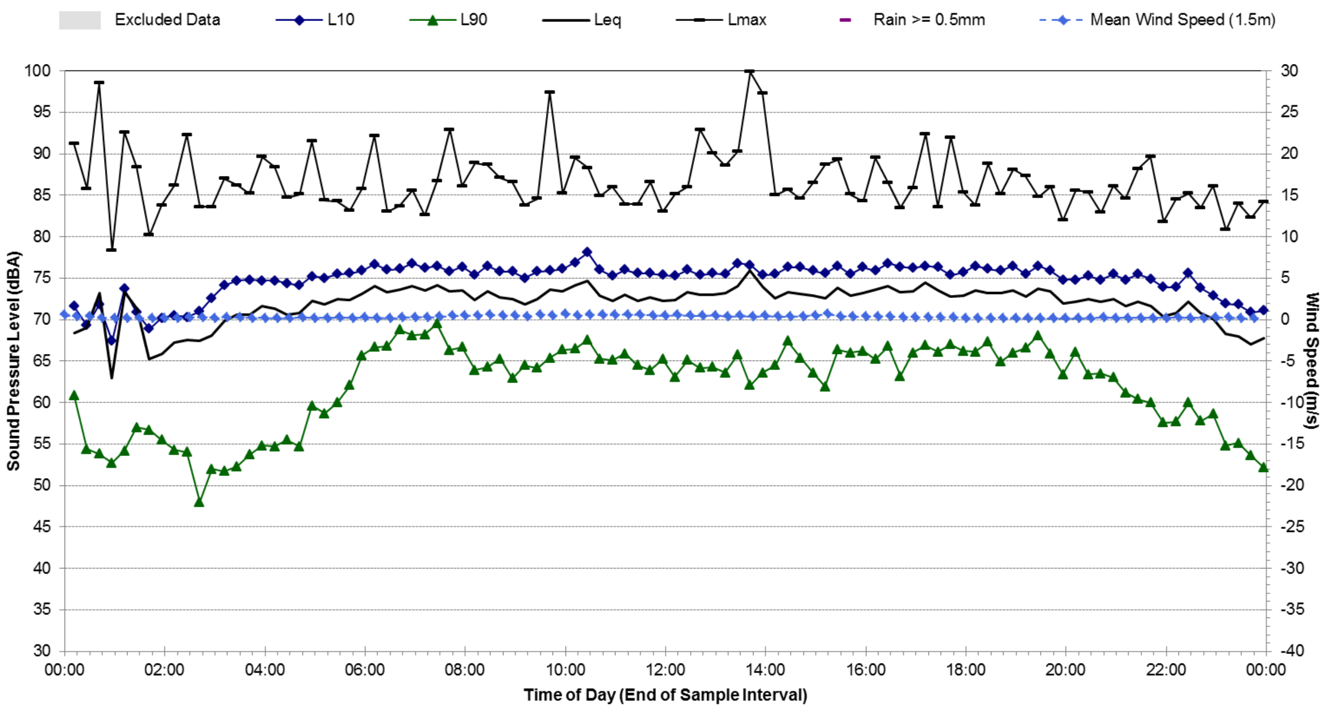
Statistical Ambient Noise Levels

L06 - Qantas Drive, Mascot - Wednesday, 24 July 2019



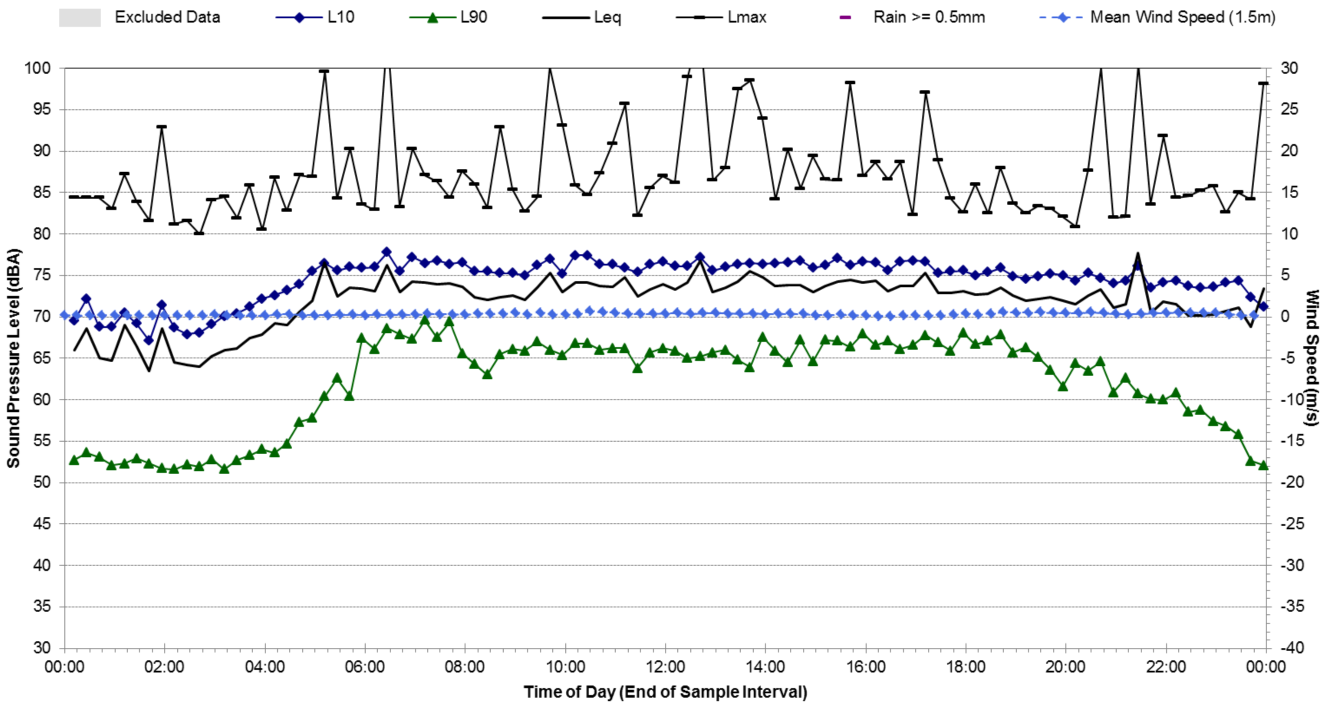
Statistical Ambient Noise Levels

L06 - Qantas Drive, Mascot - Thursday, 25 July 2019



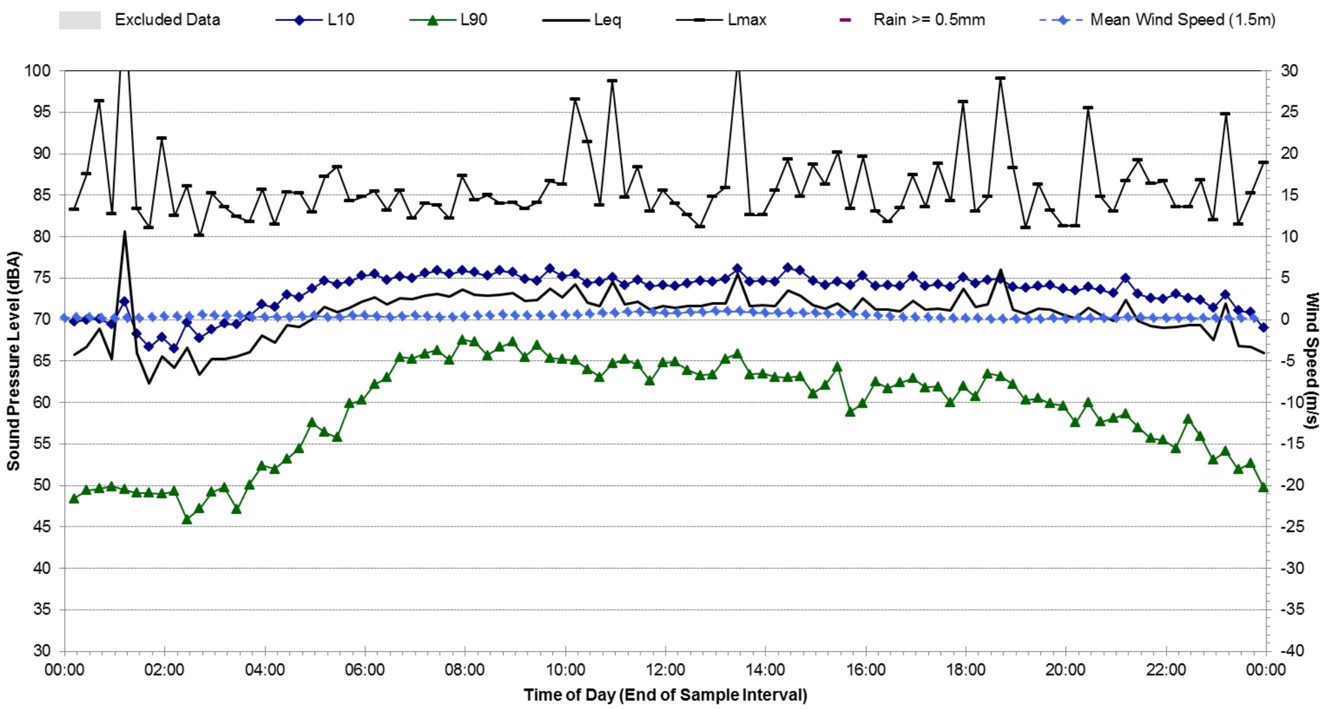
Statistical Ambient Noise Levels

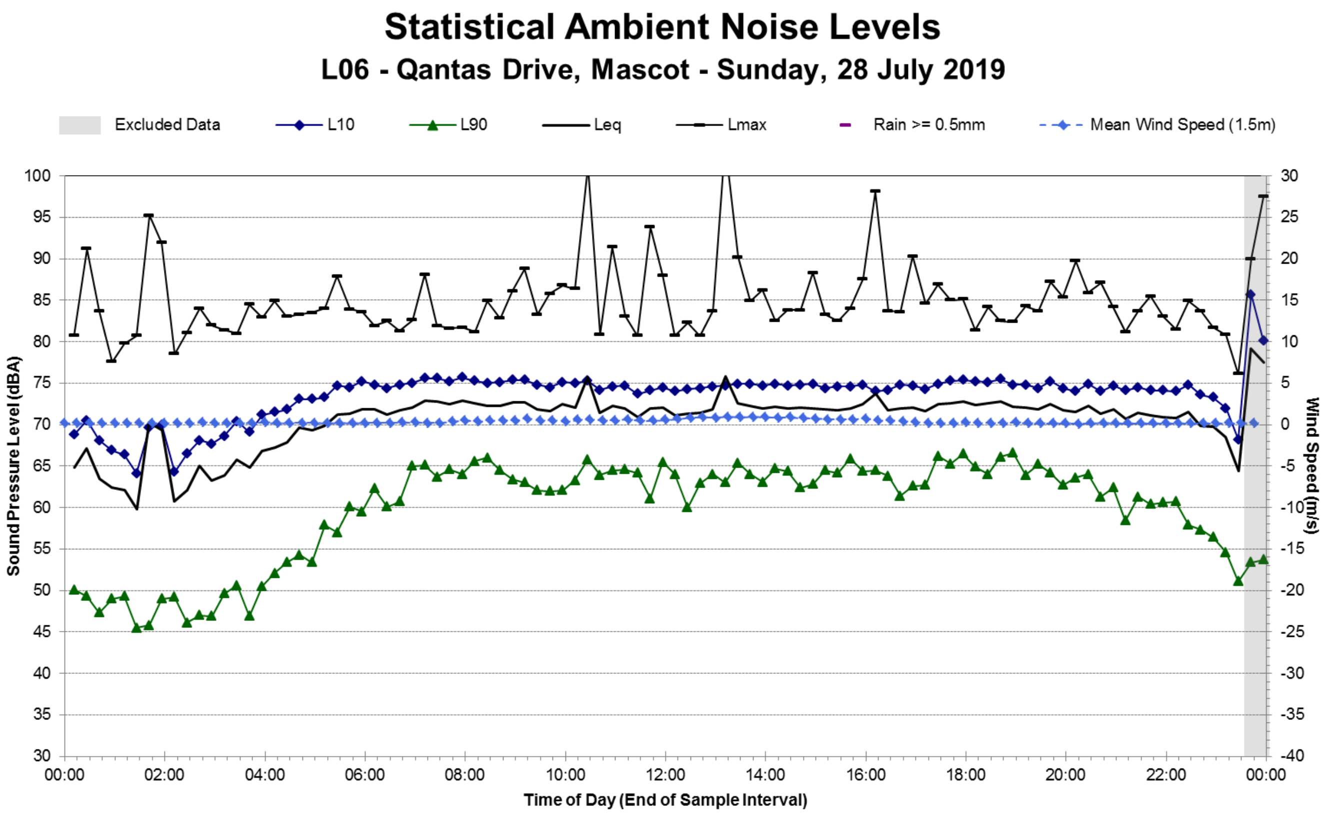
L06 - Qantas Drive, Mascot - Friday, 26 July 2019

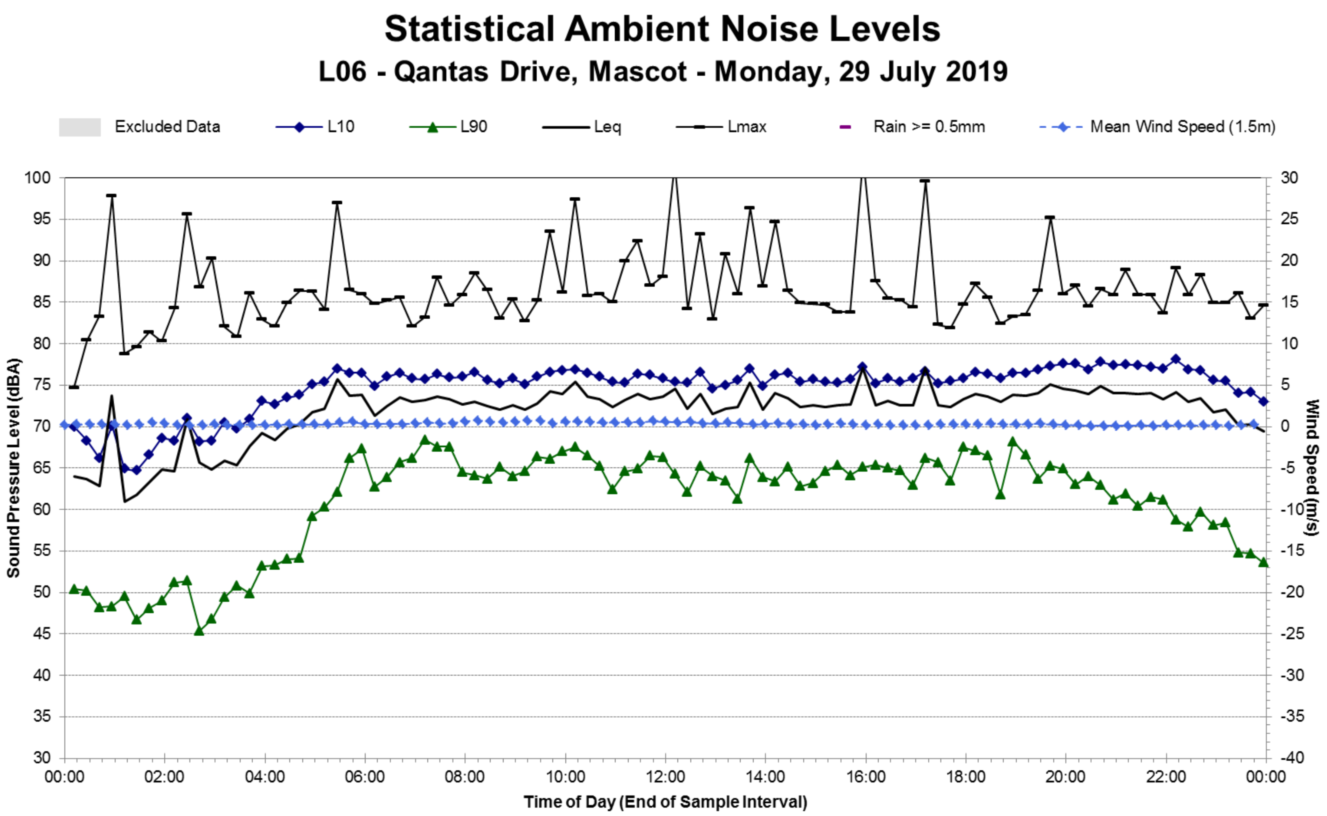


Statistical Ambient Noise Levels

L06 - Qantas Drive, Mascot - Saturday, 27 July 2019

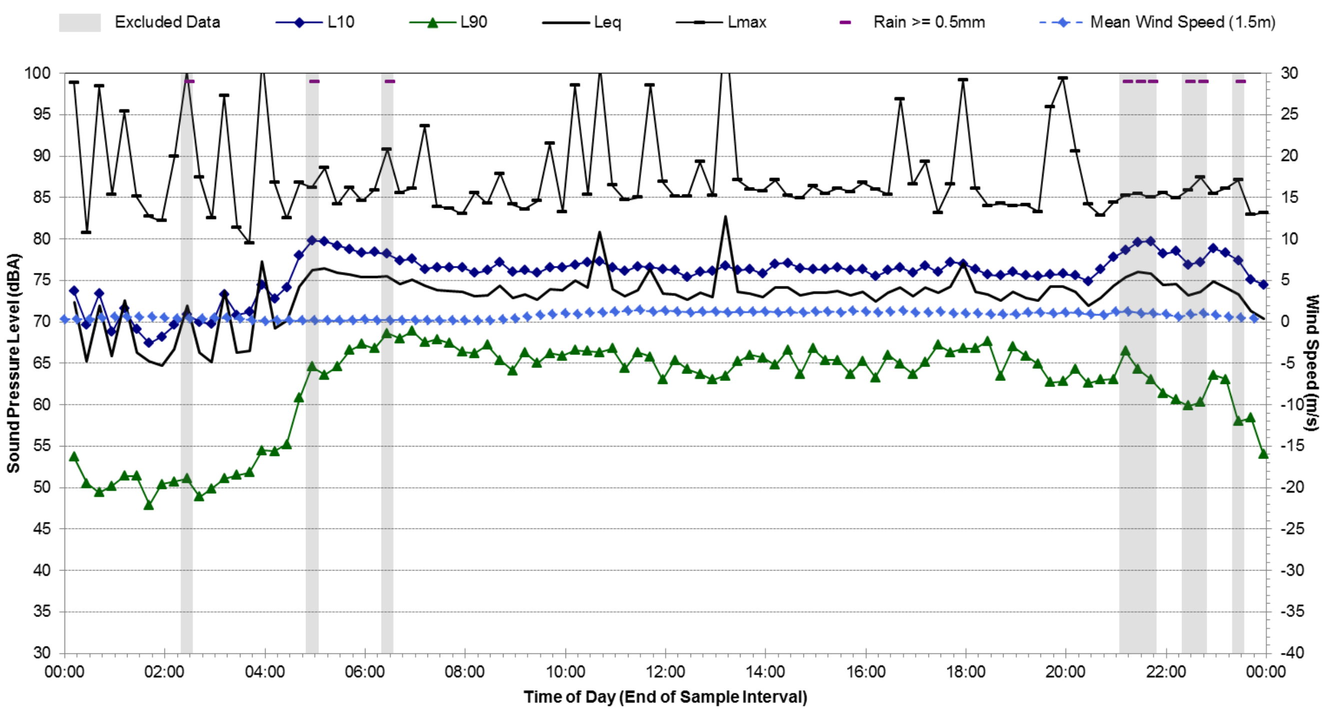



Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Sunday, 28 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Monday, 29 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

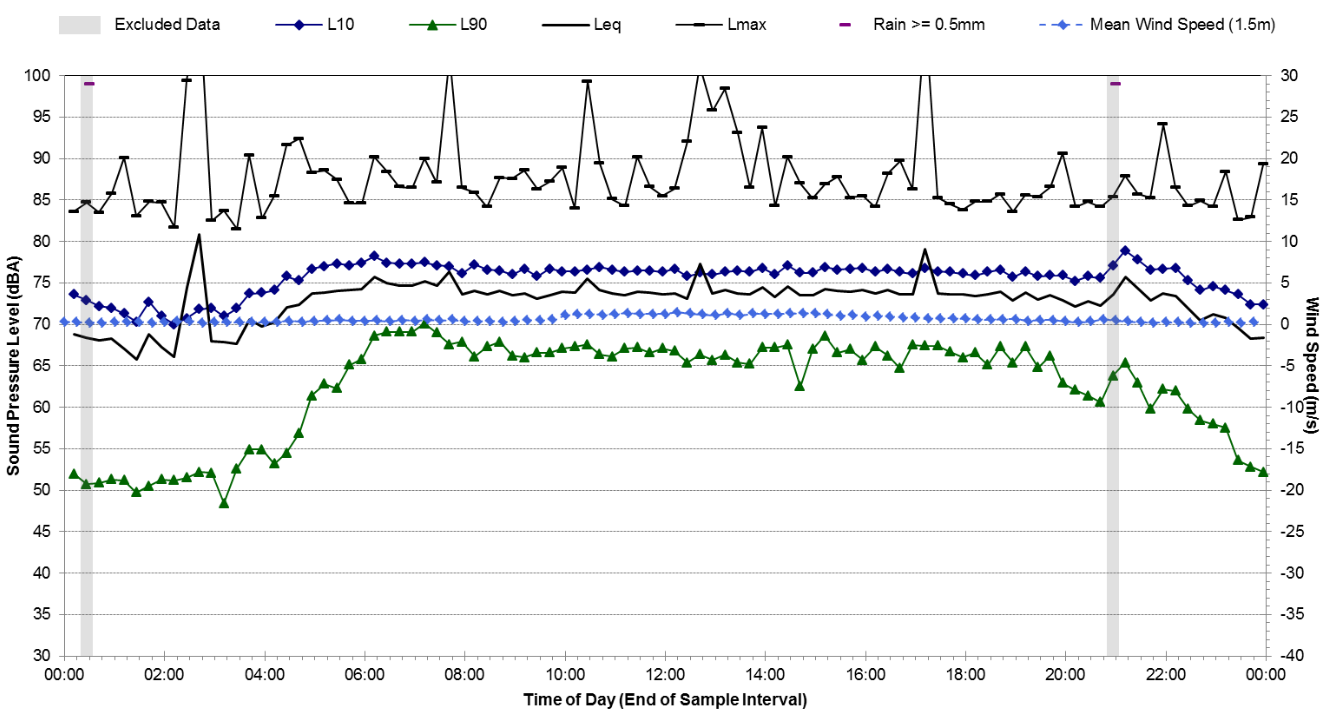
Statistical Ambient Noise Levels

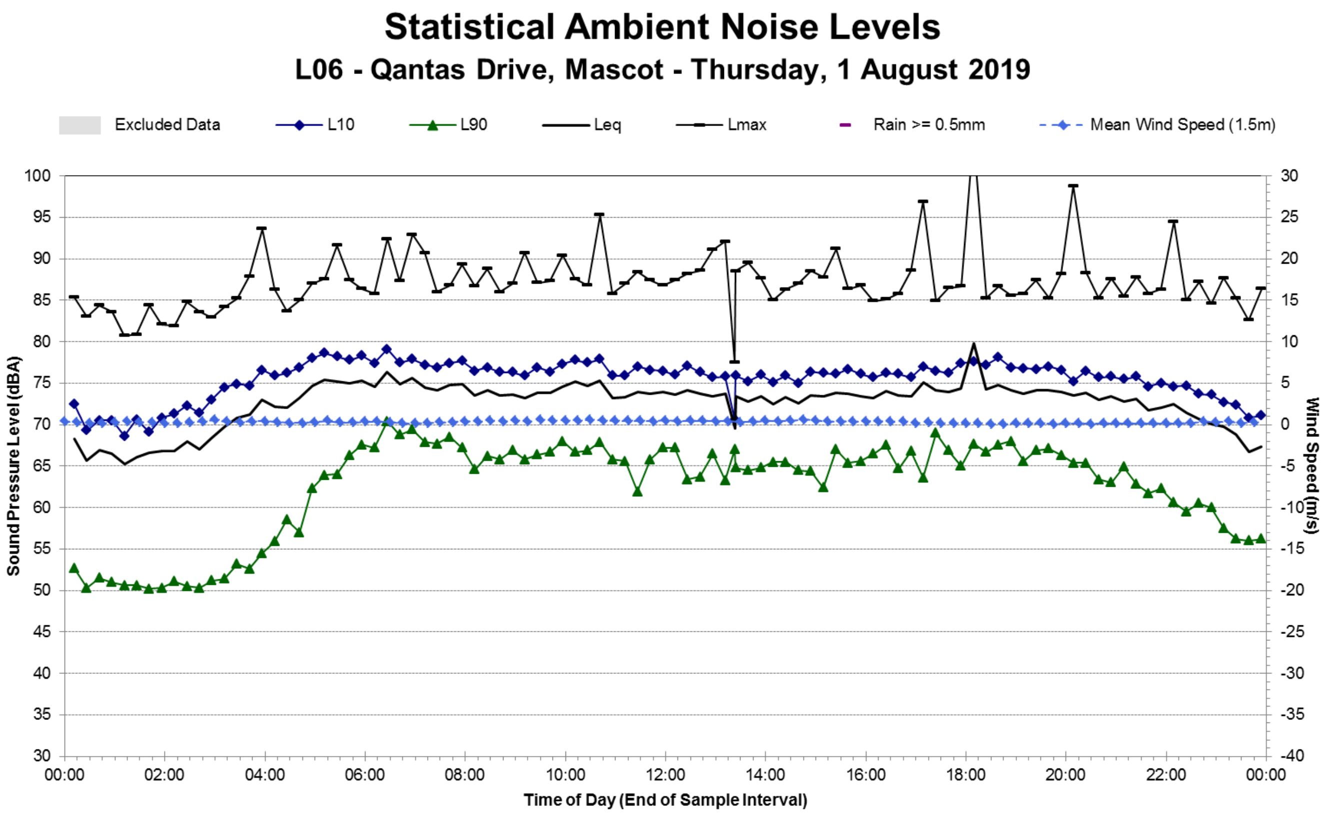
L06 - Qantas Drive, Mascot - Tuesday, 30 July 2019



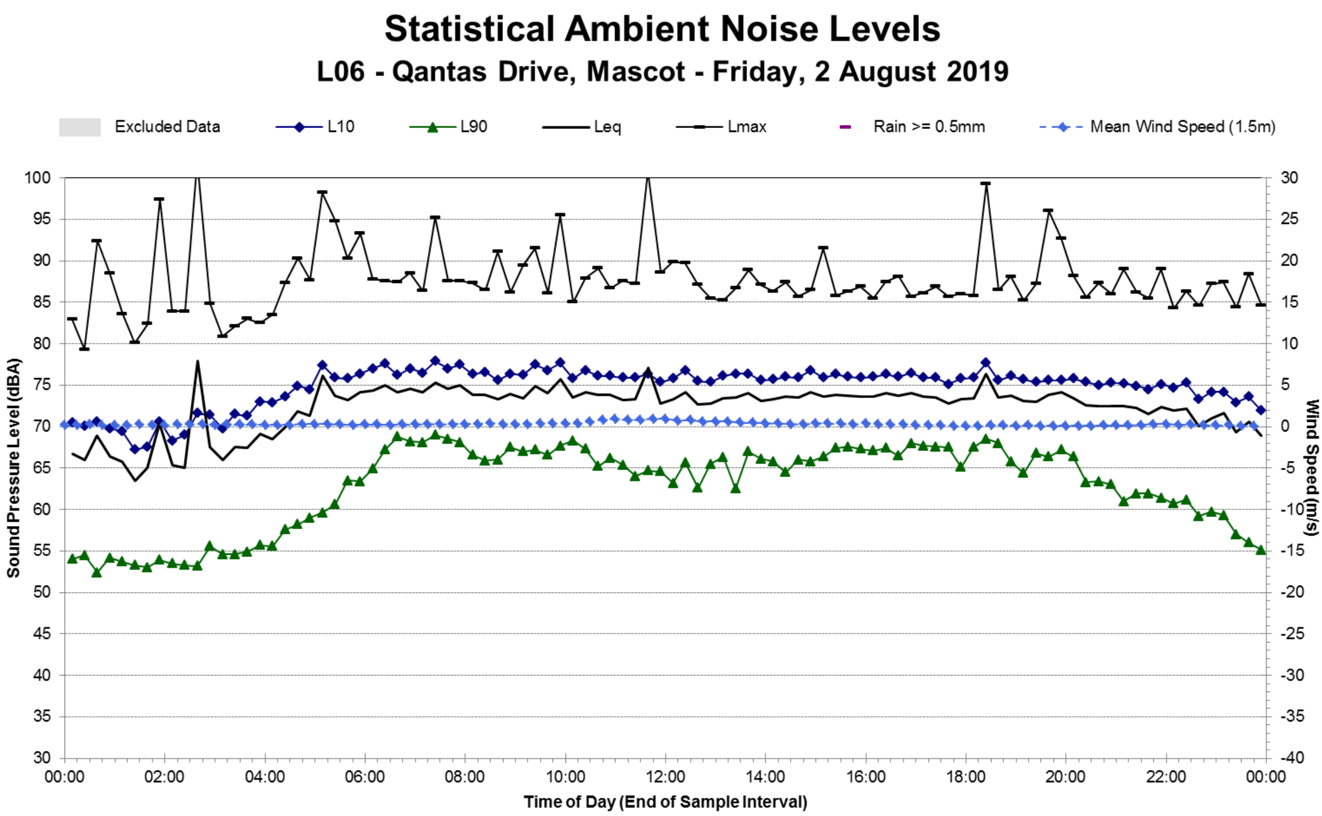
Statistical Ambient Noise Levels

L06 - Qantas Drive, Mascot - Wednesday, 31 July 2019

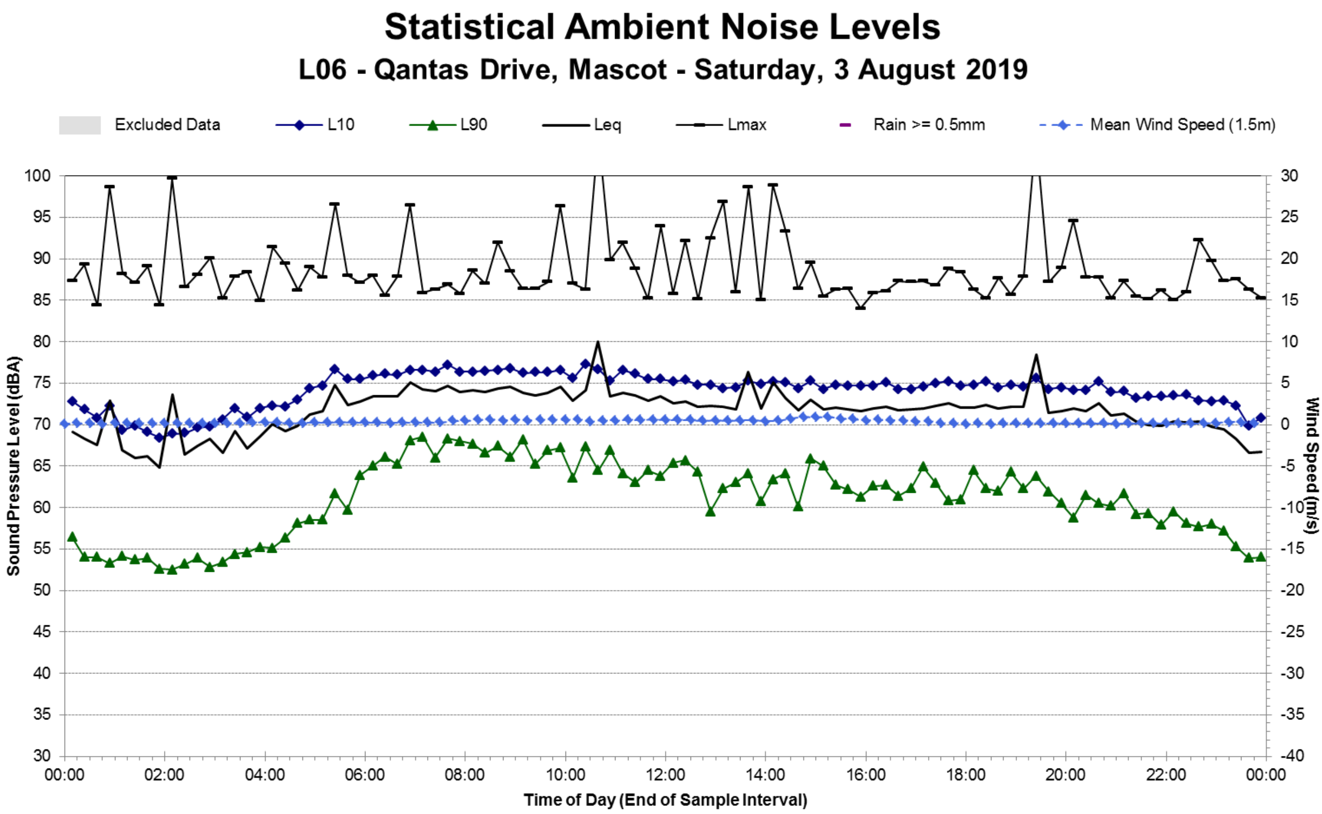




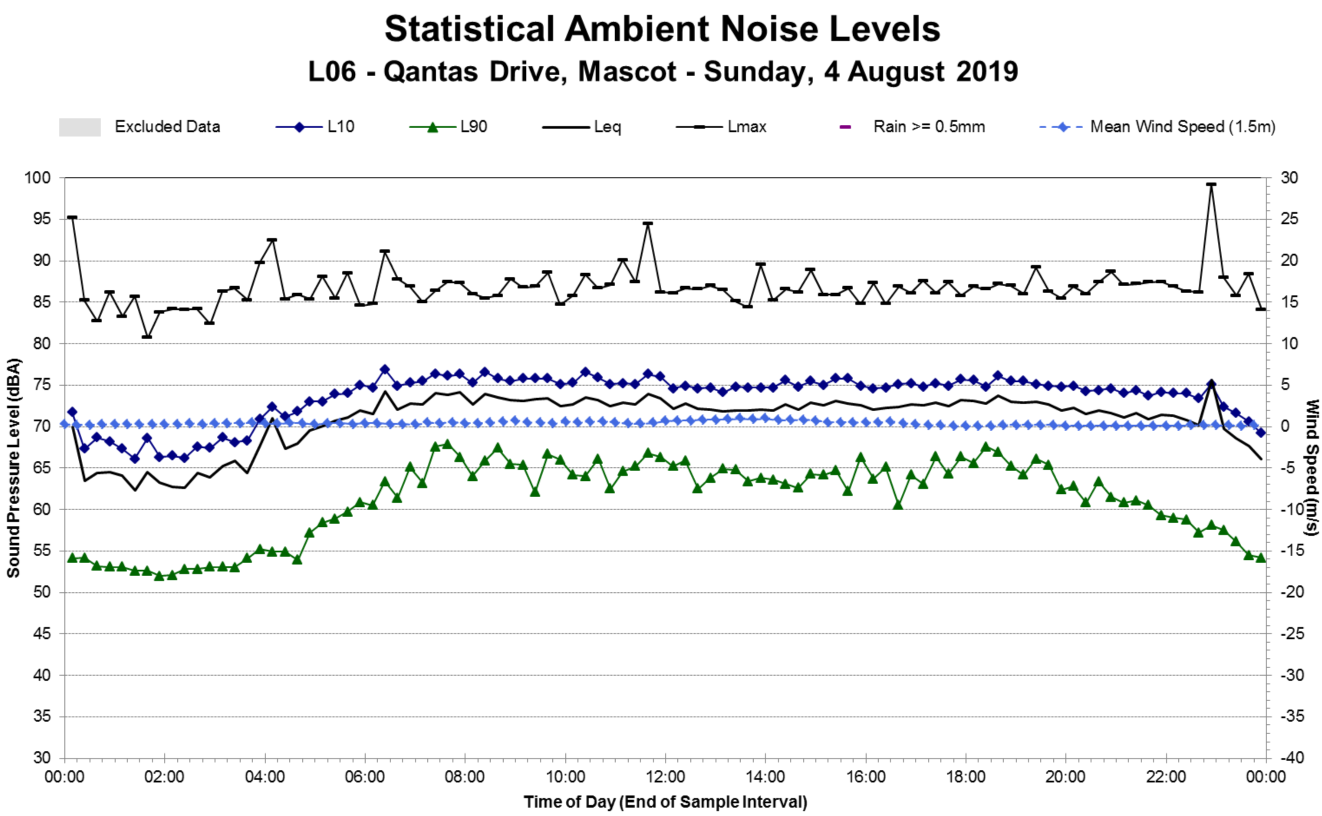
Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Thursday, 1 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



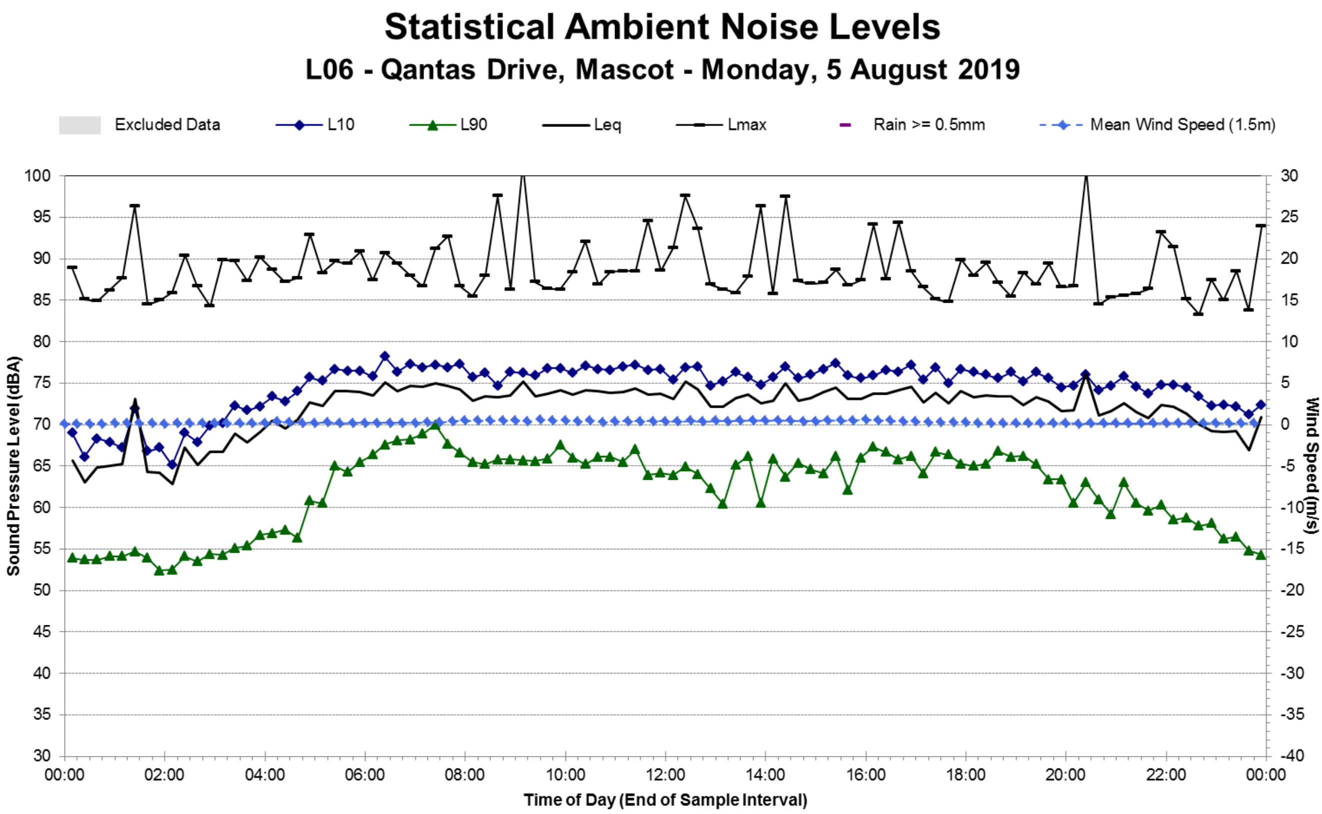
Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Friday, 2 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

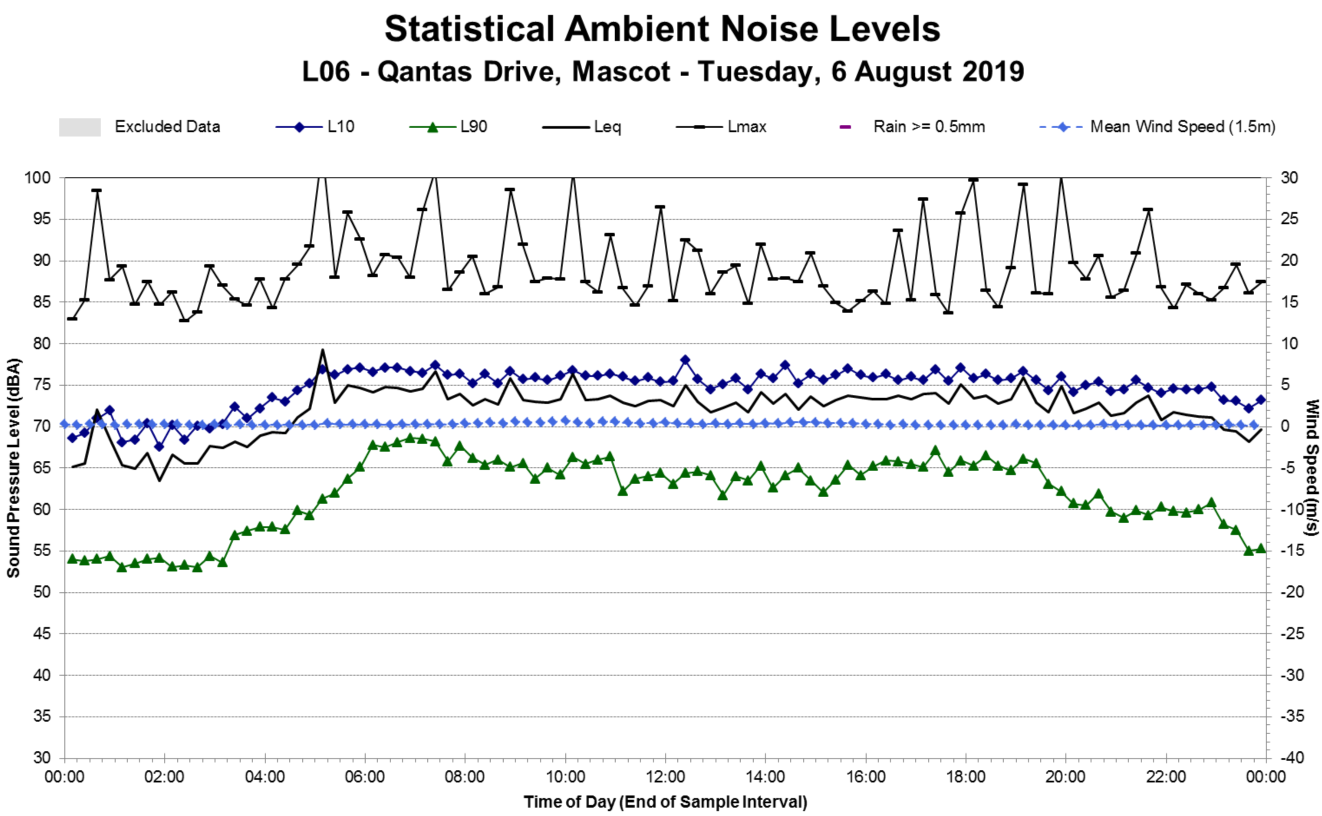


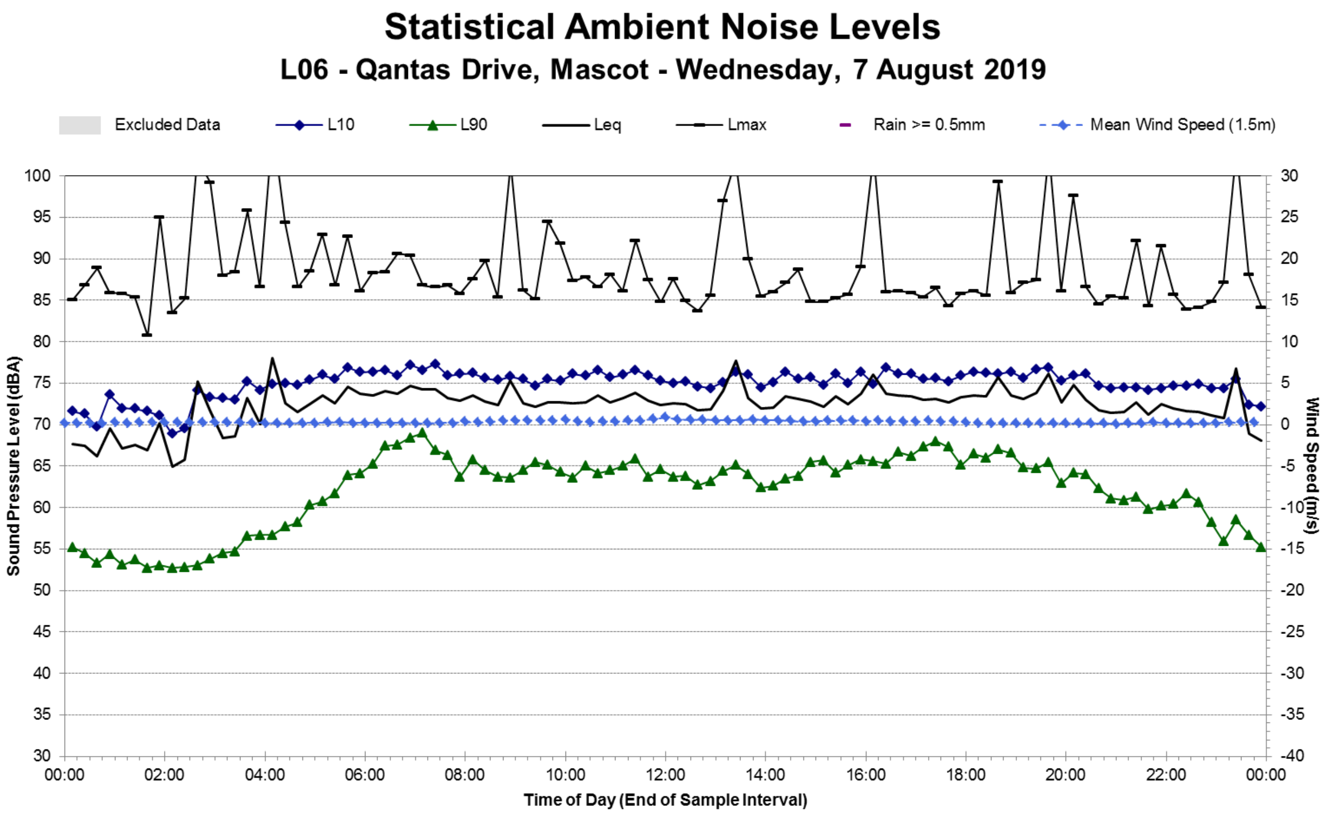
Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Saturday, 3 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



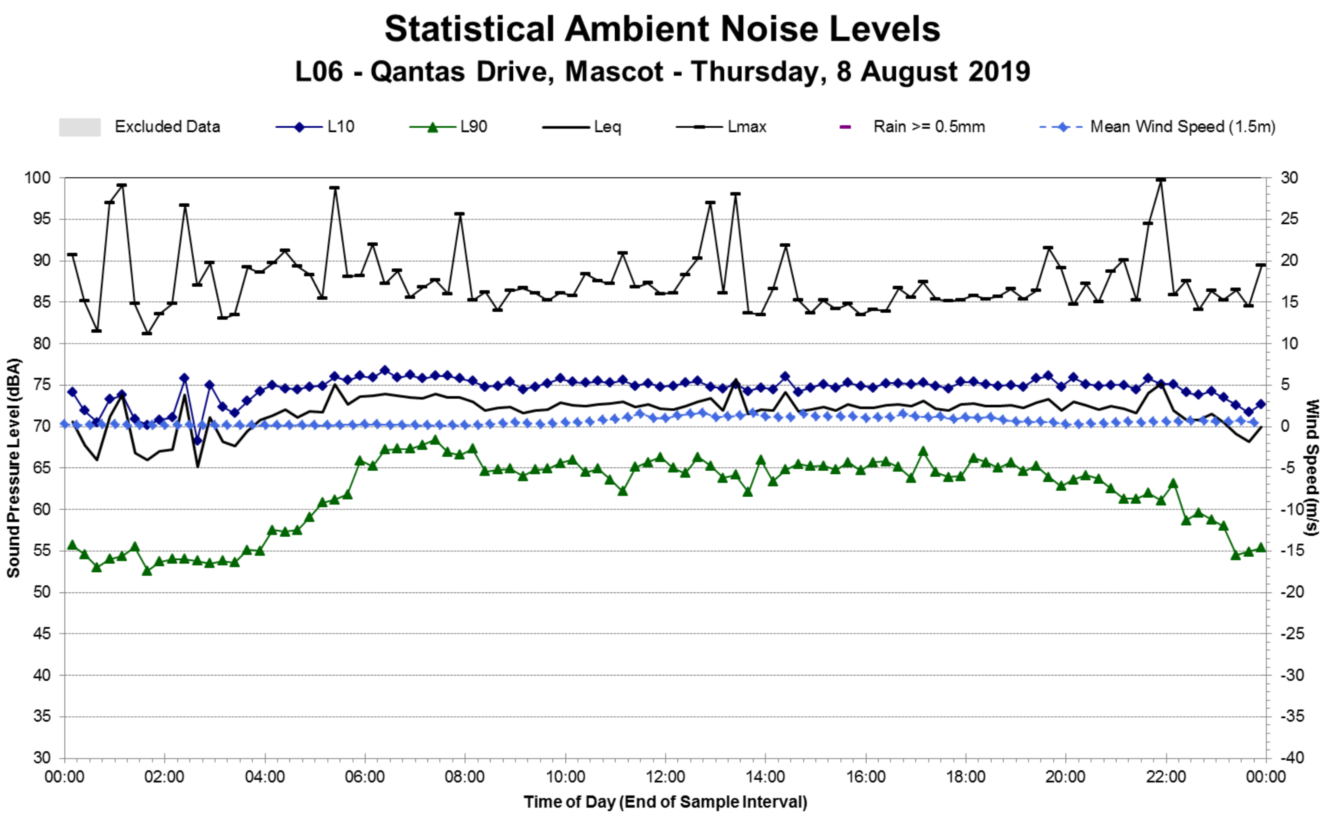
Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Sunday, 4 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Monday, 5 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Tuesday, 6 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



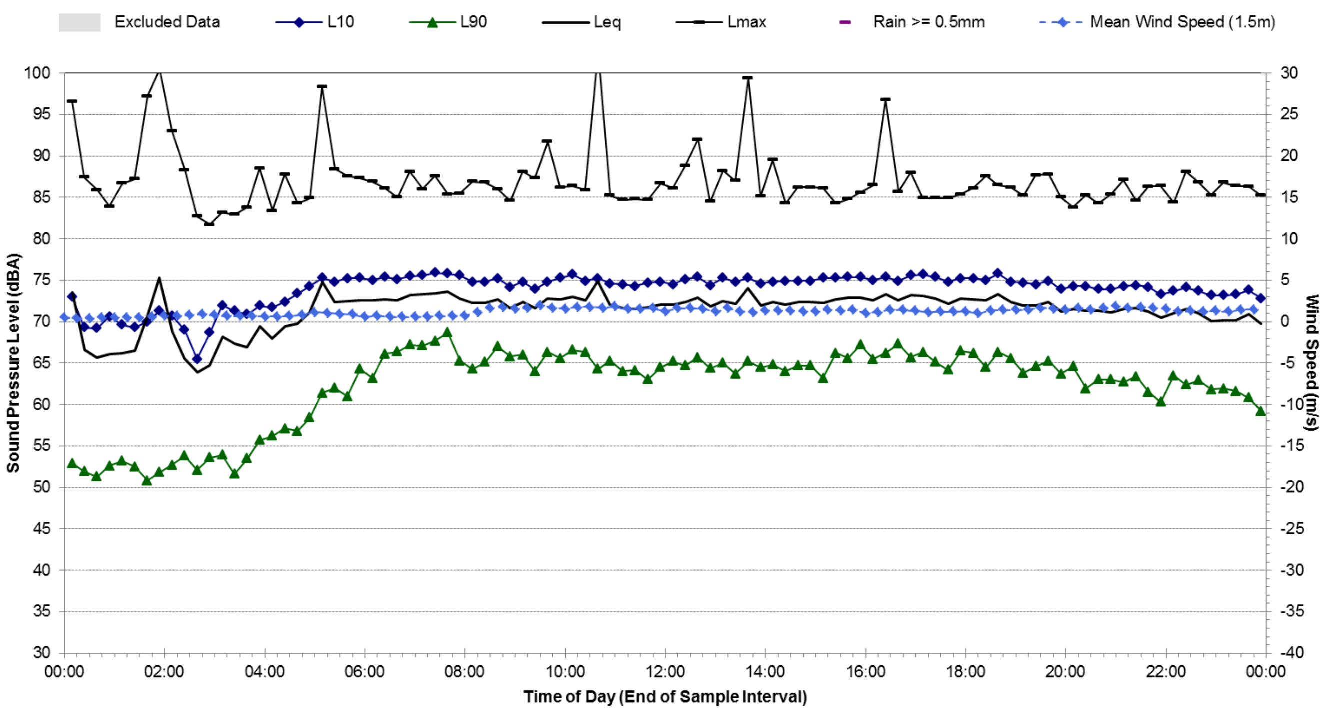
Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Wednesday, 7 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
L06 - Qantas Drive, Mascot - Thursday, 8 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

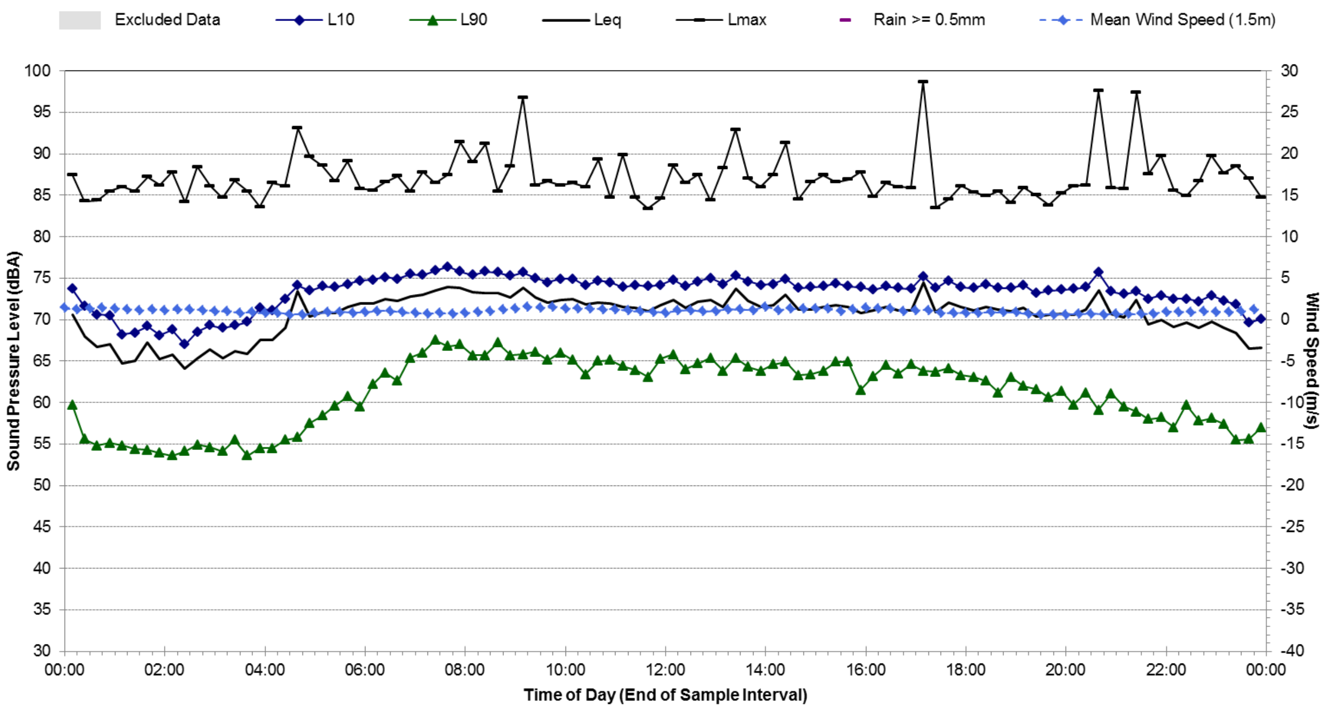
Statistical Ambient Noise Levels

L06 - Qantas Drive, Mascot - Friday, 9 August 2019



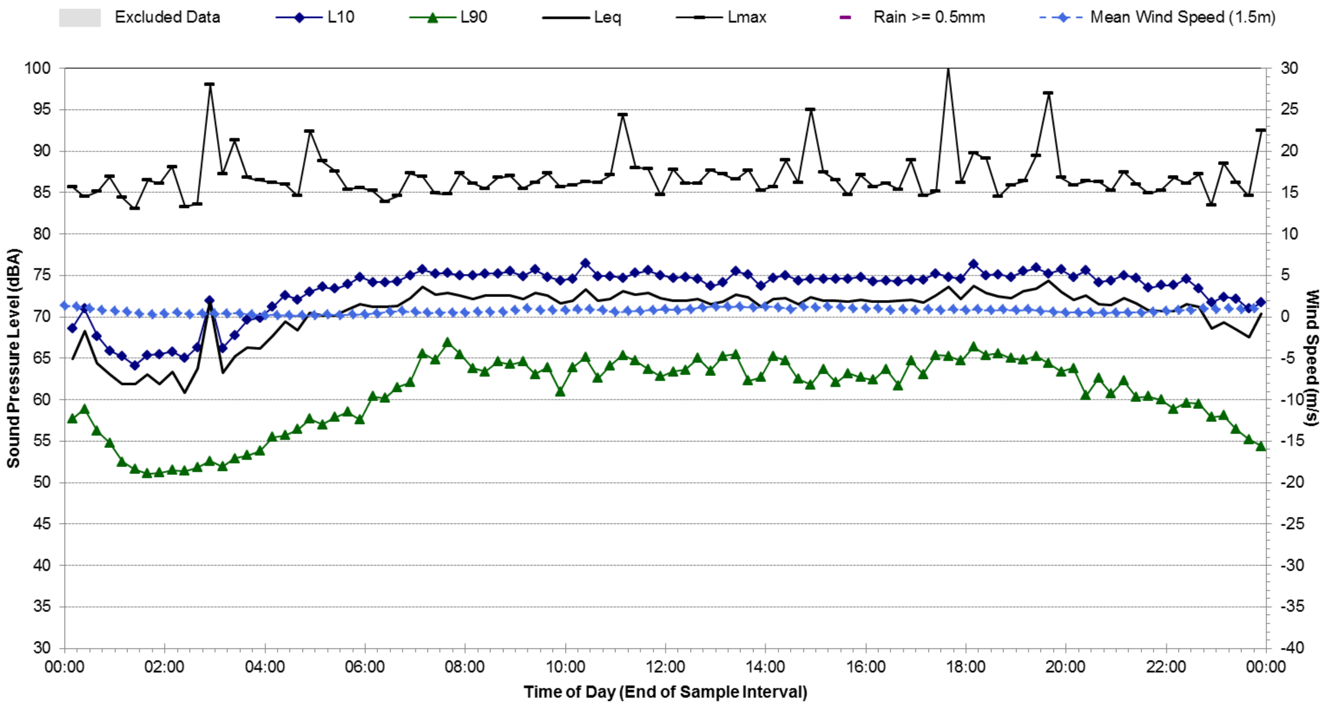
Statistical Ambient Noise Levels

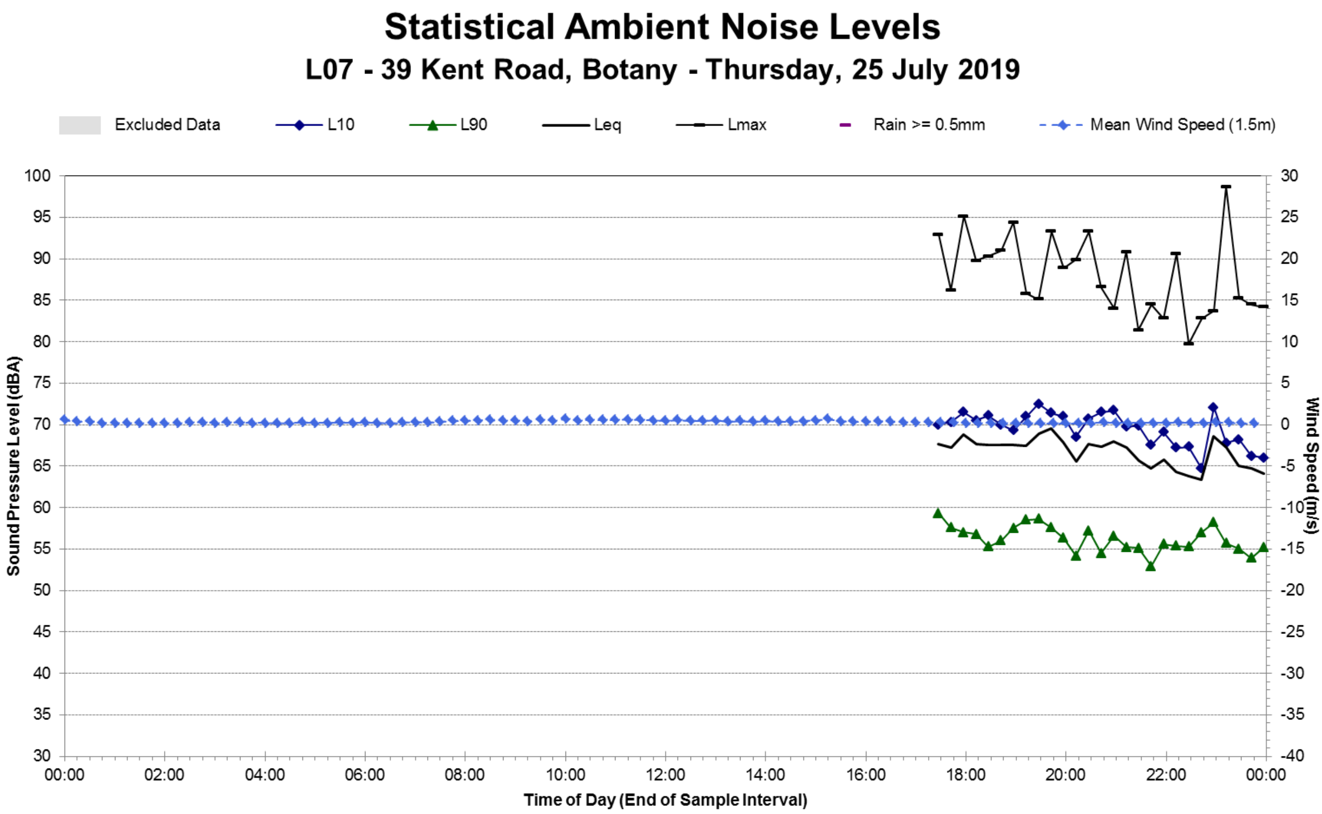
L06 - Qantas Drive, Mascot - Saturday, 10 August 2019



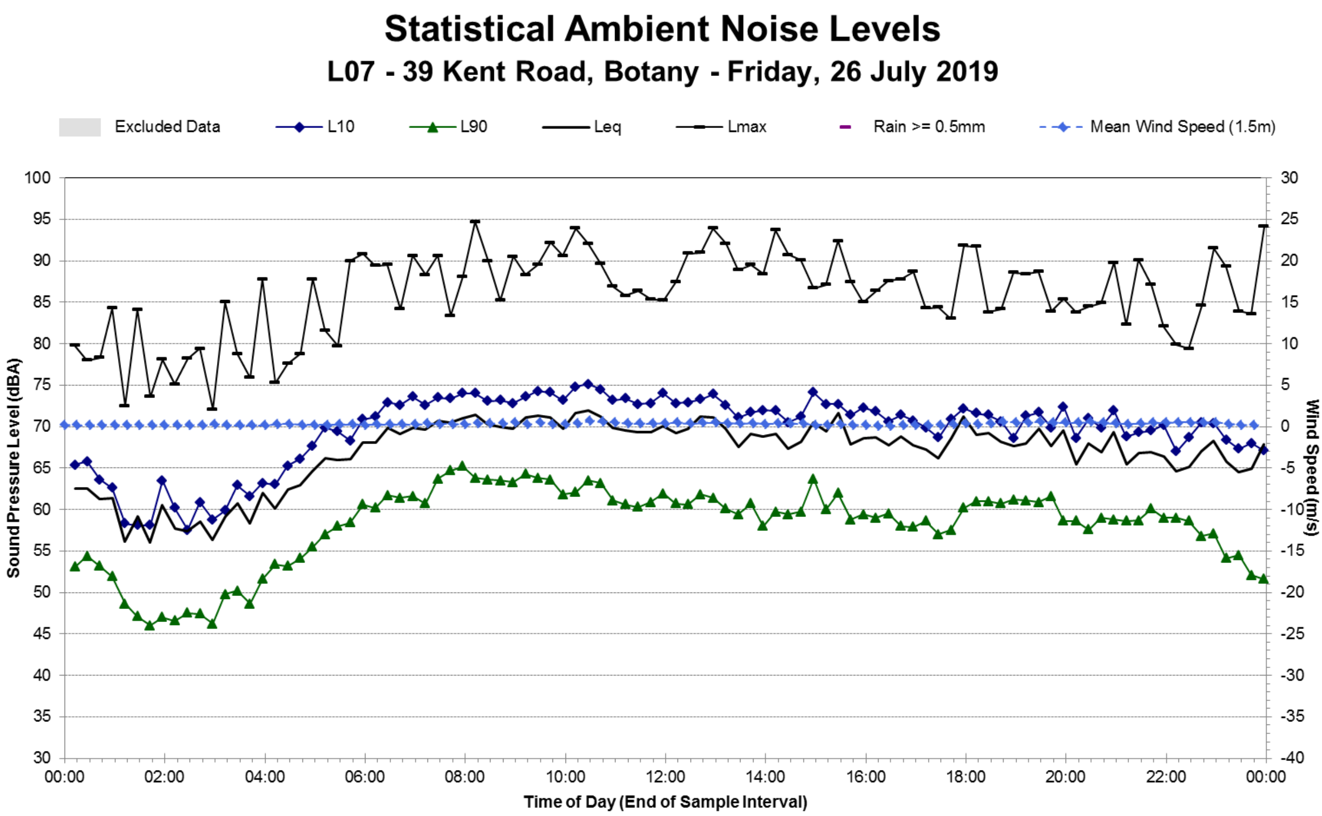
Statistical Ambient Noise Levels

L06 - Qantas Drive, Mascot - Sunday, 11 August 2019





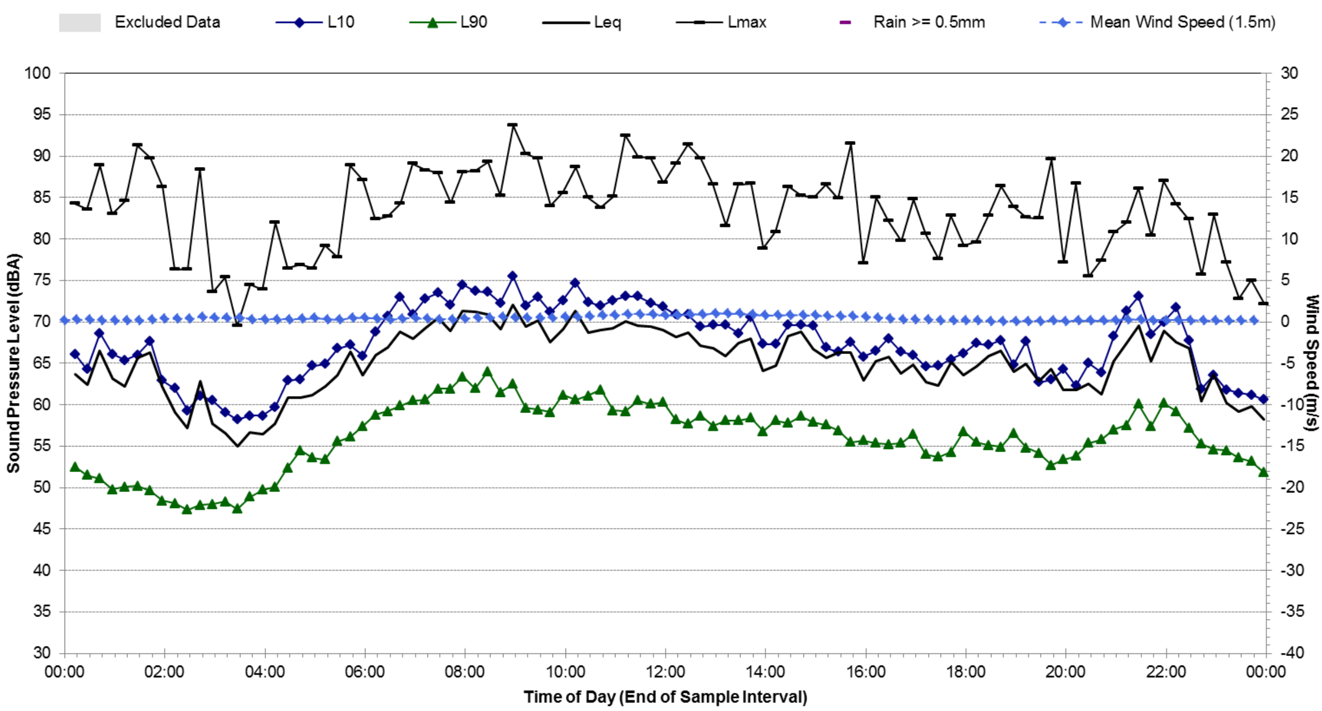
Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Friday, 26 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

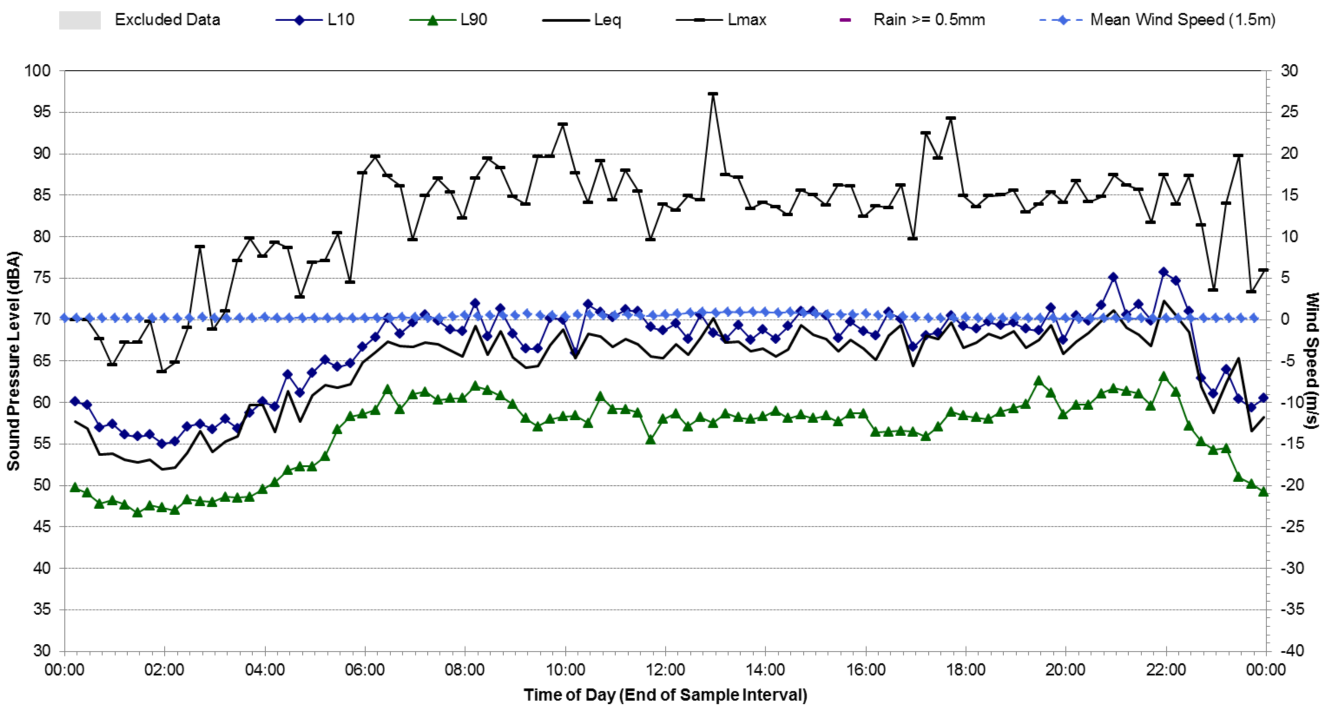
Statistical Ambient Noise Levels

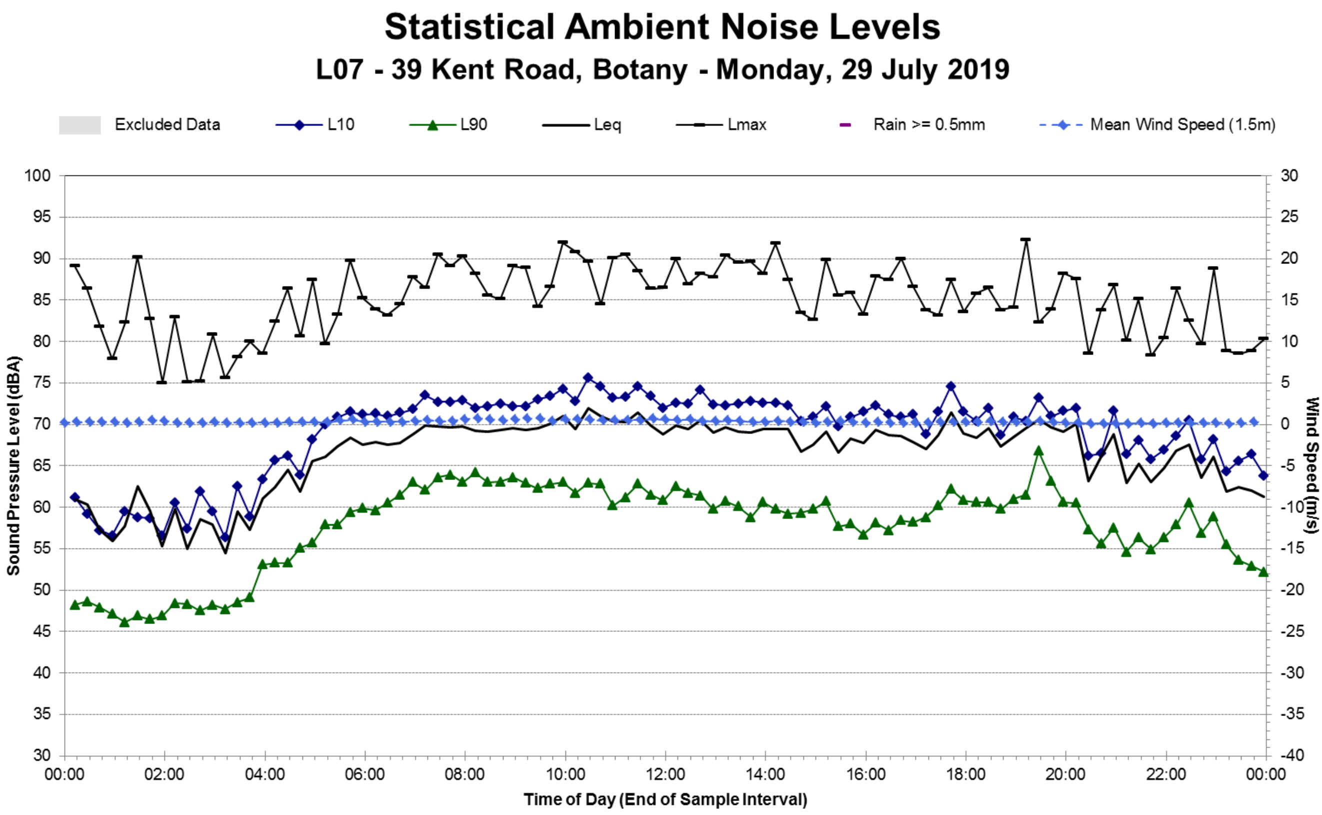
L07 - 39 Kent Road, Botany - Saturday, 27 July 2019

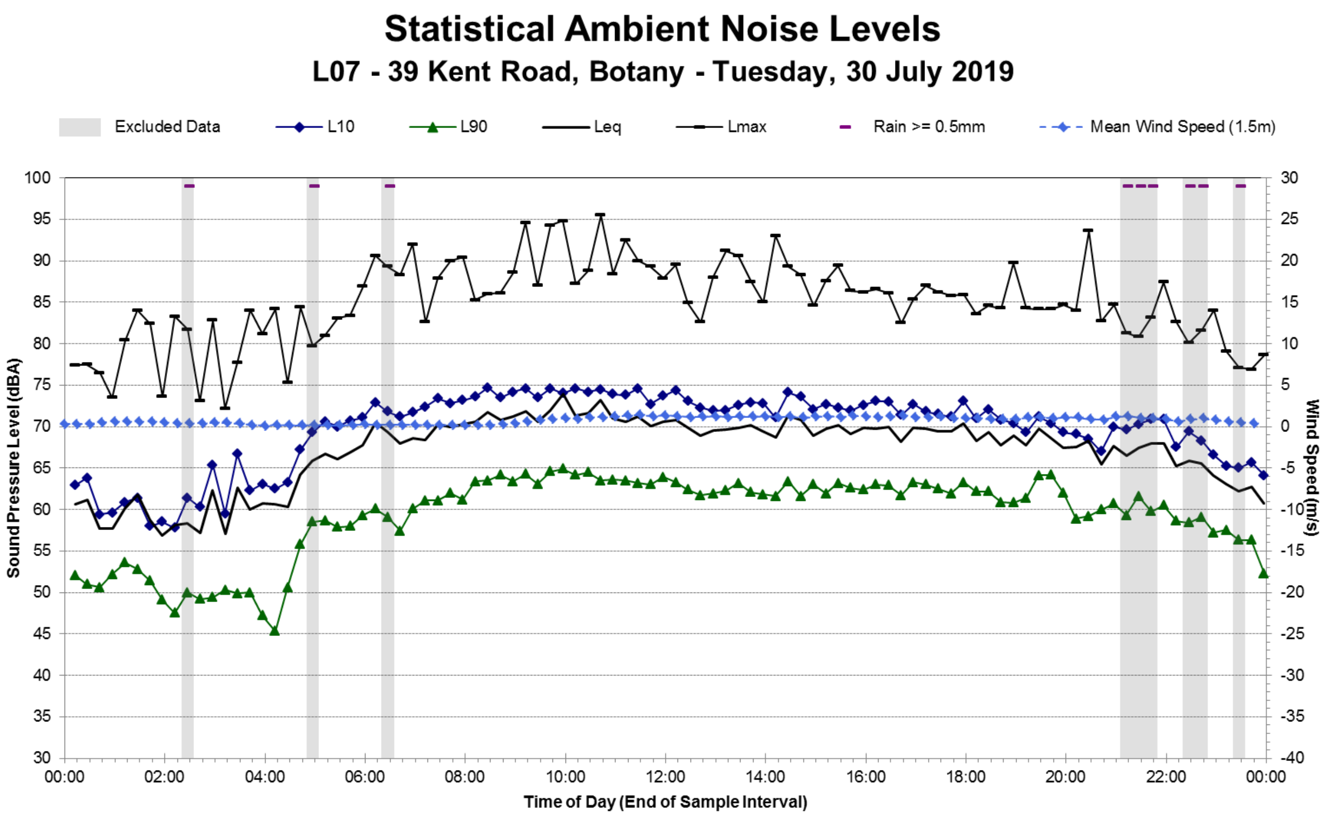


Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Sunday, 28 July 2019

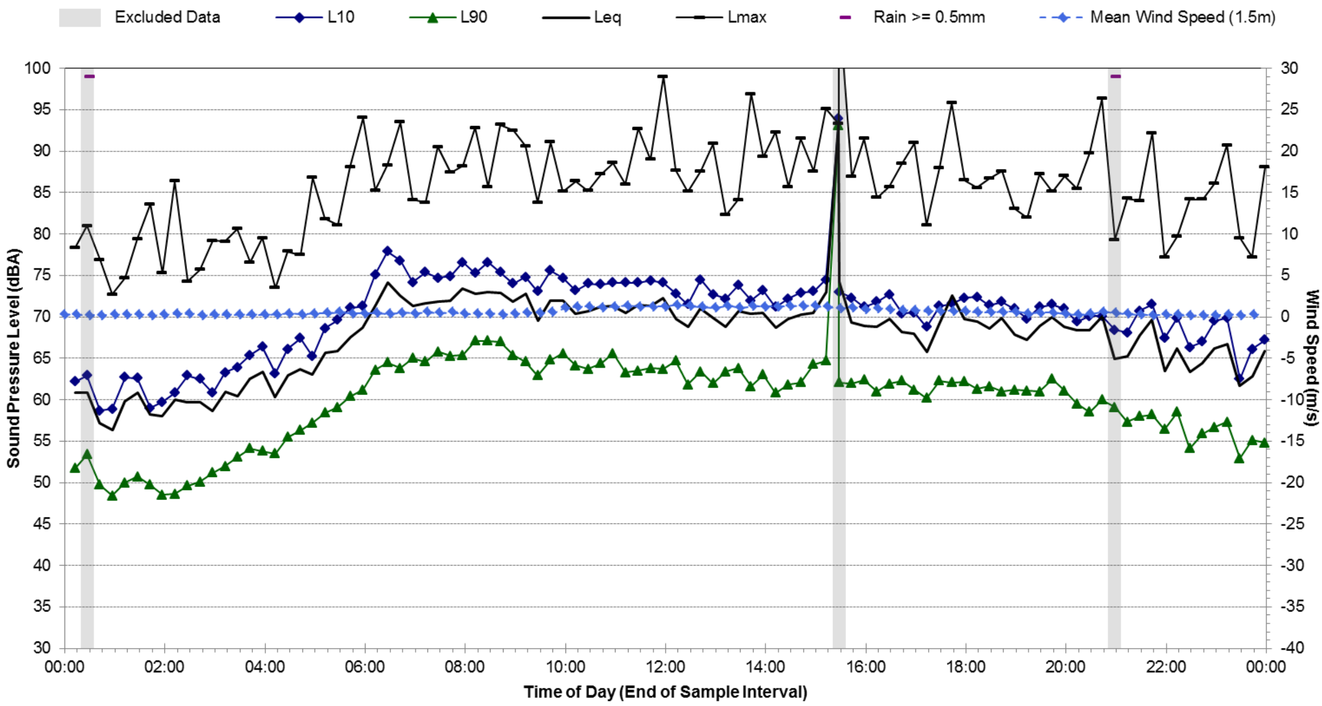



Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Monday, 29 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Tuesday, 30 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

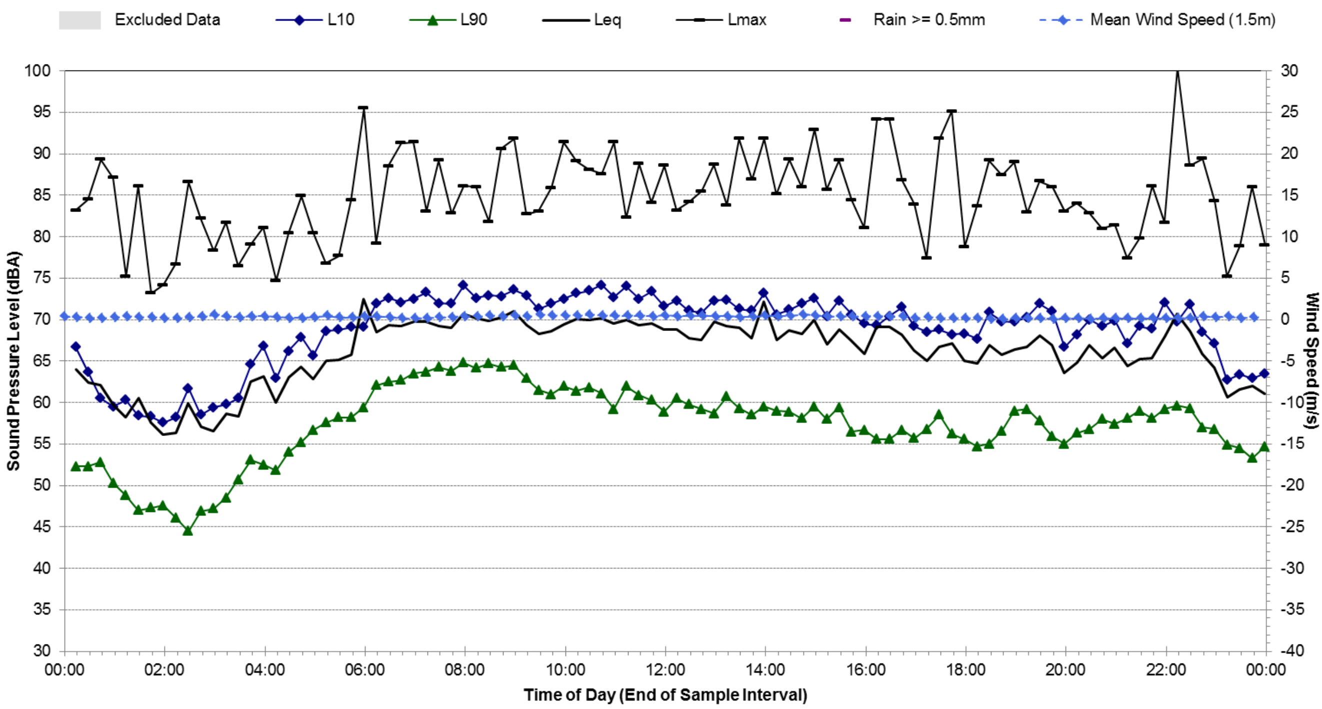
Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Wednesday, 31 July 2019

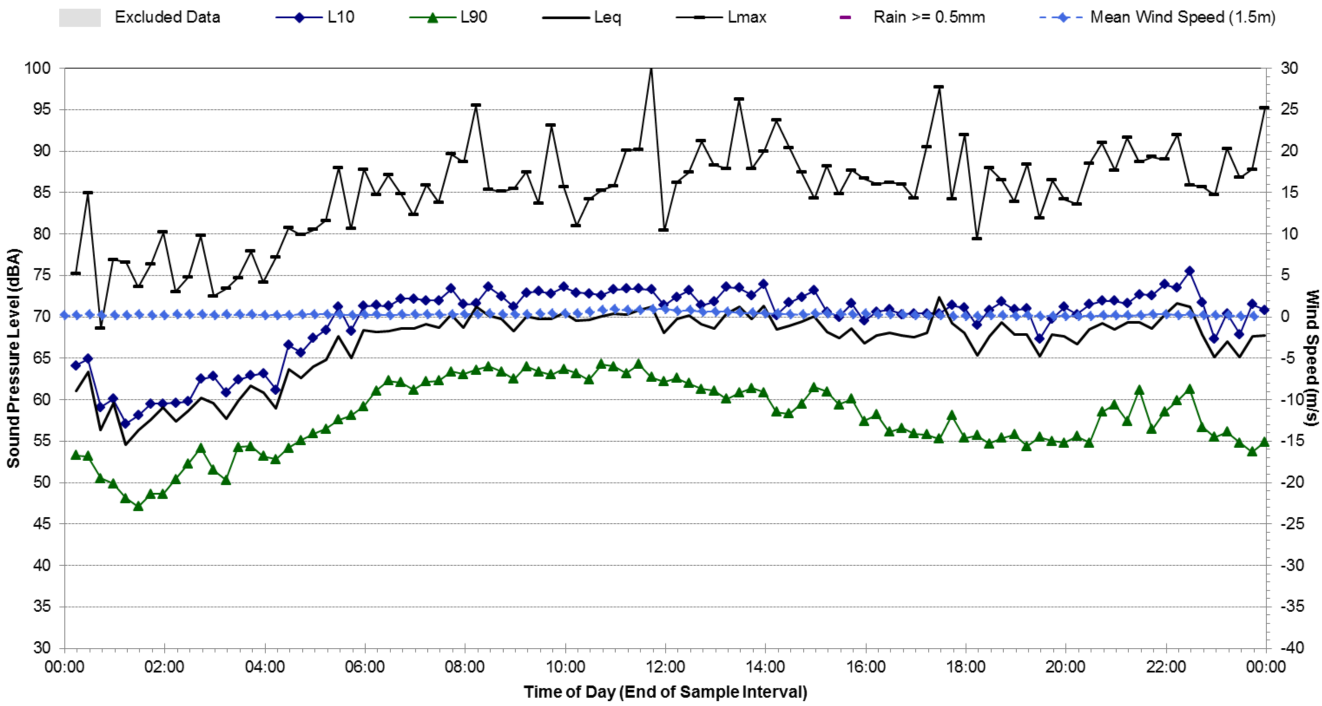


Statistical Ambient Noise Levels

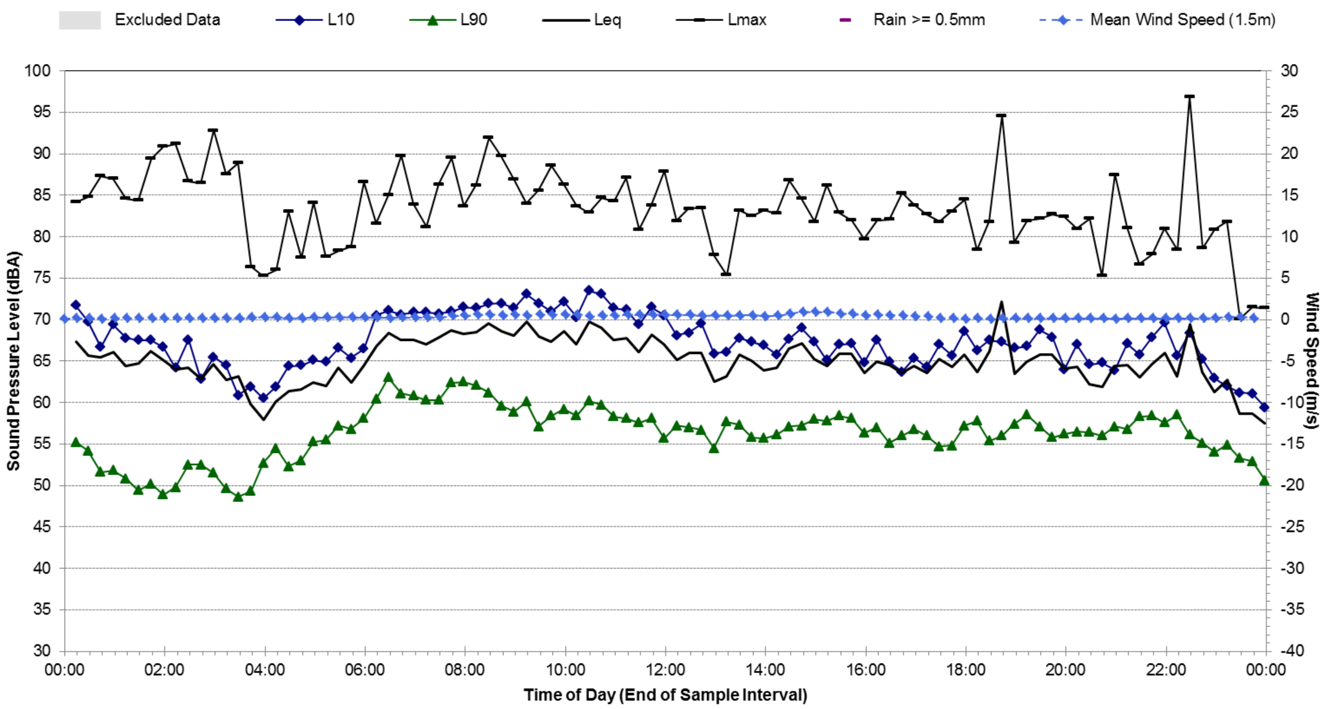
L07 - 39 Kent Road, Botany - Thursday, 1 August 2019



Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Friday, 2 August 2019

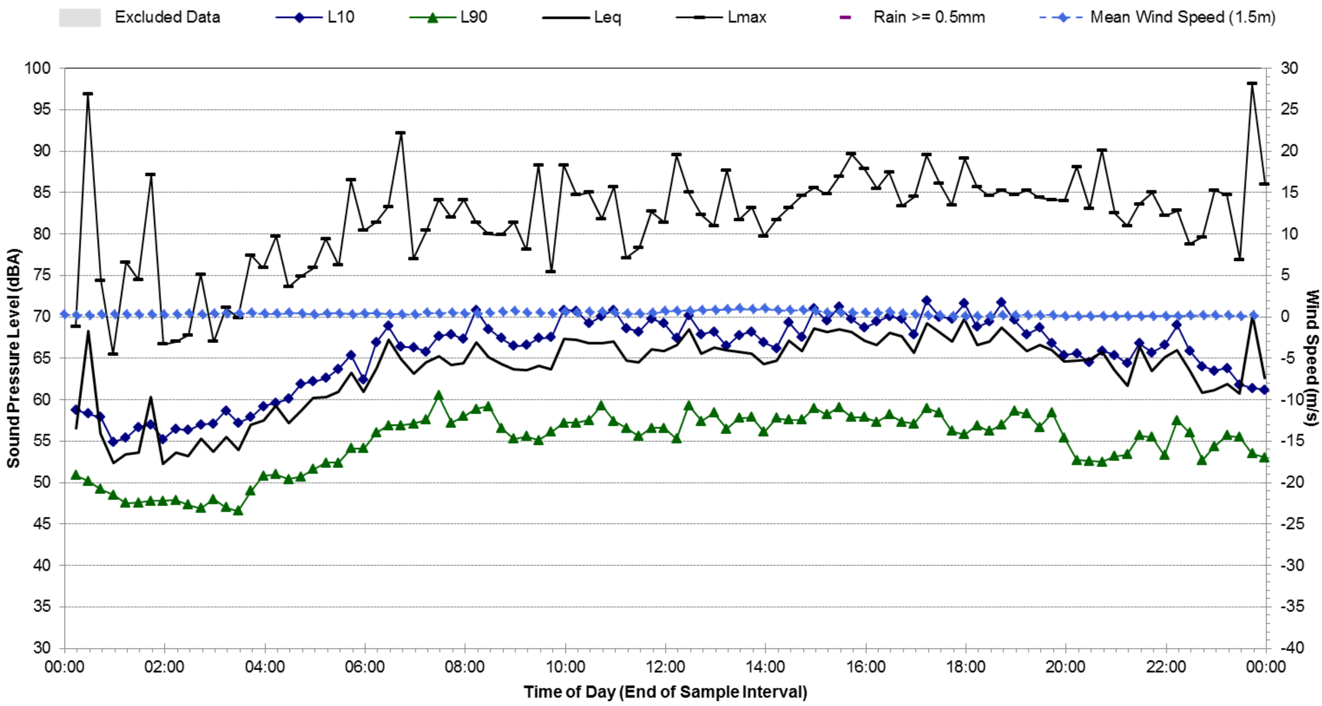


Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Saturday, 3 August 2019



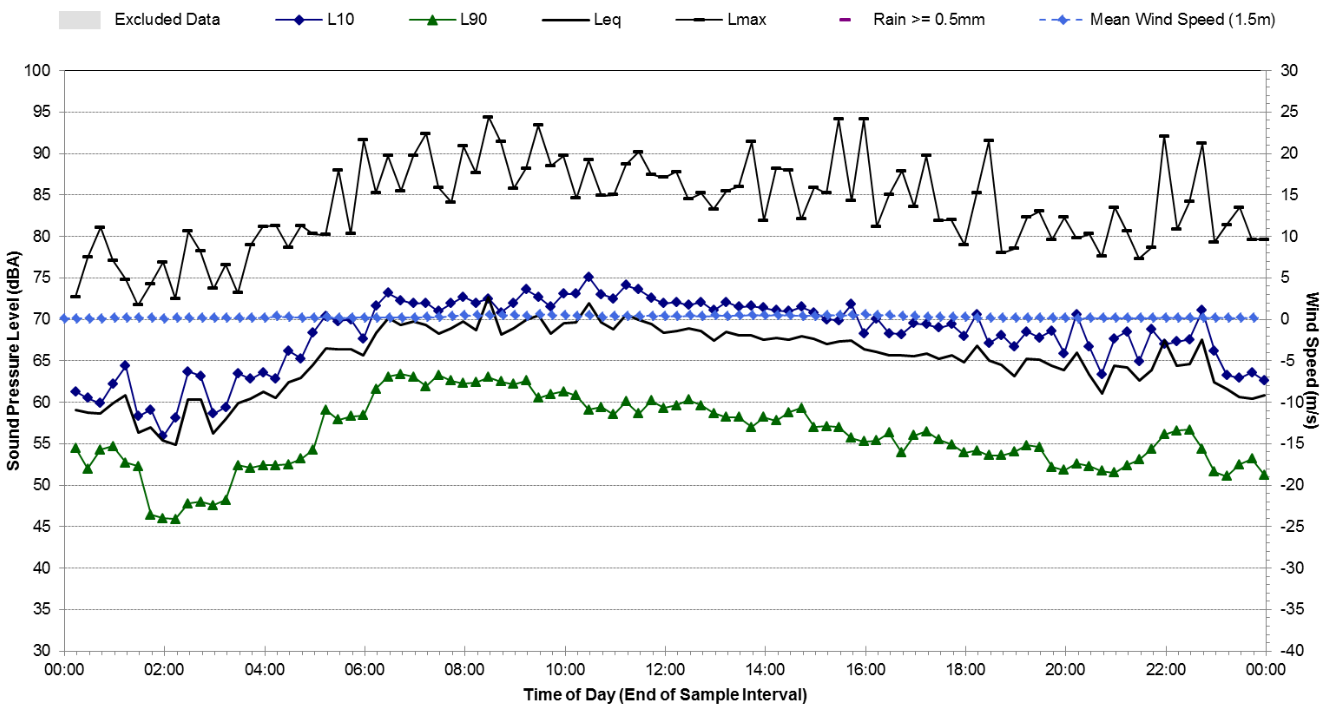
Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Sunday, 4 August 2019



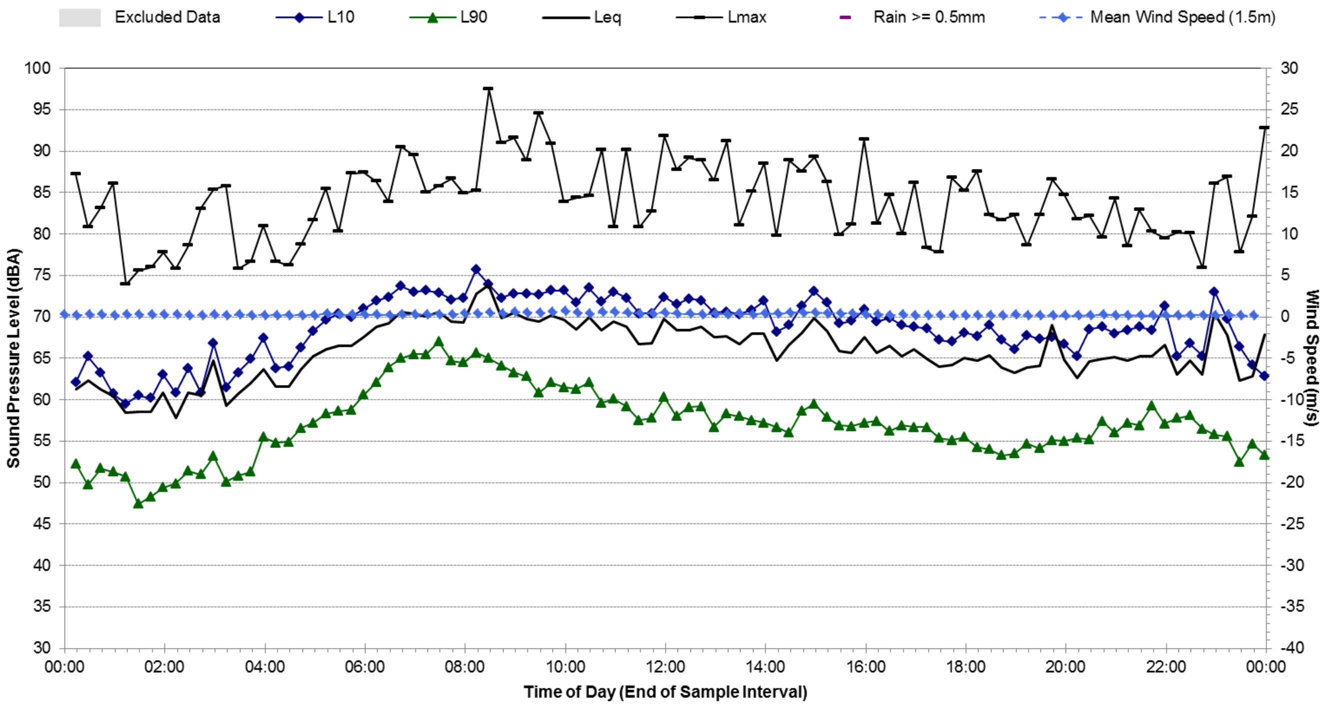
Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Monday, 5 August 2019



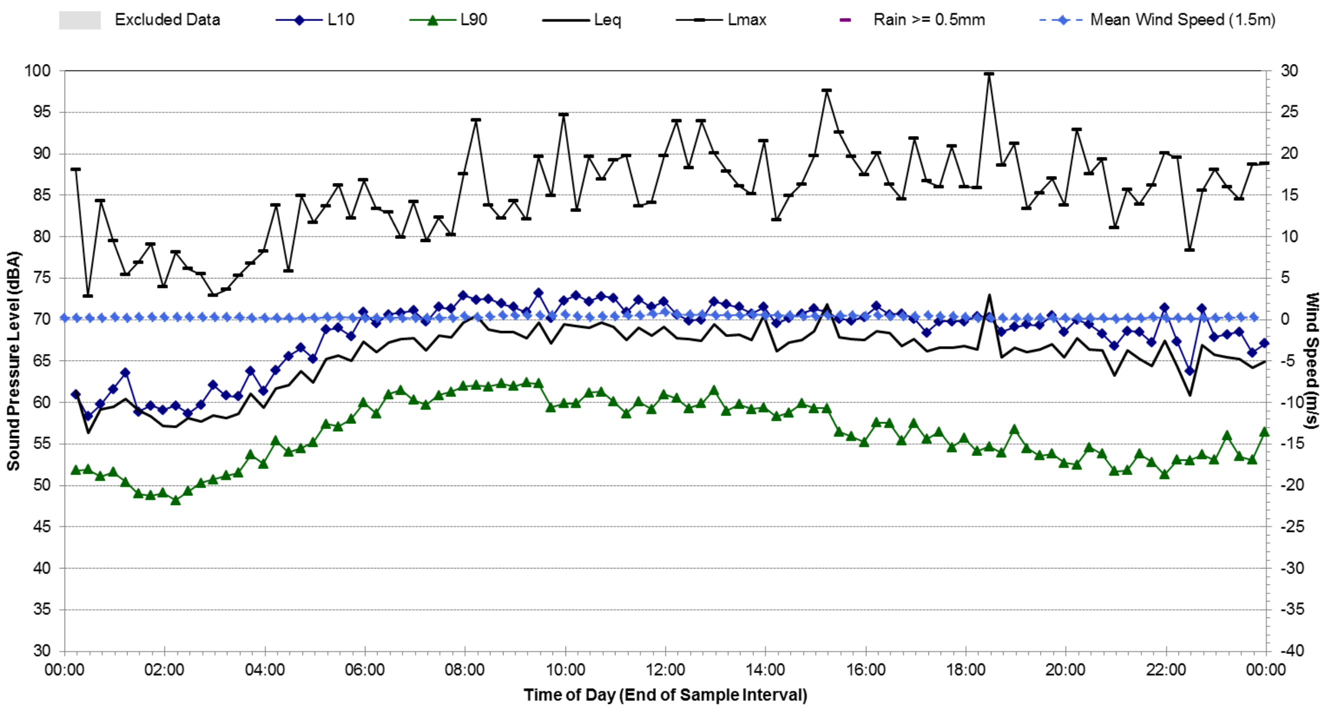
Statistical Ambient Noise Levels

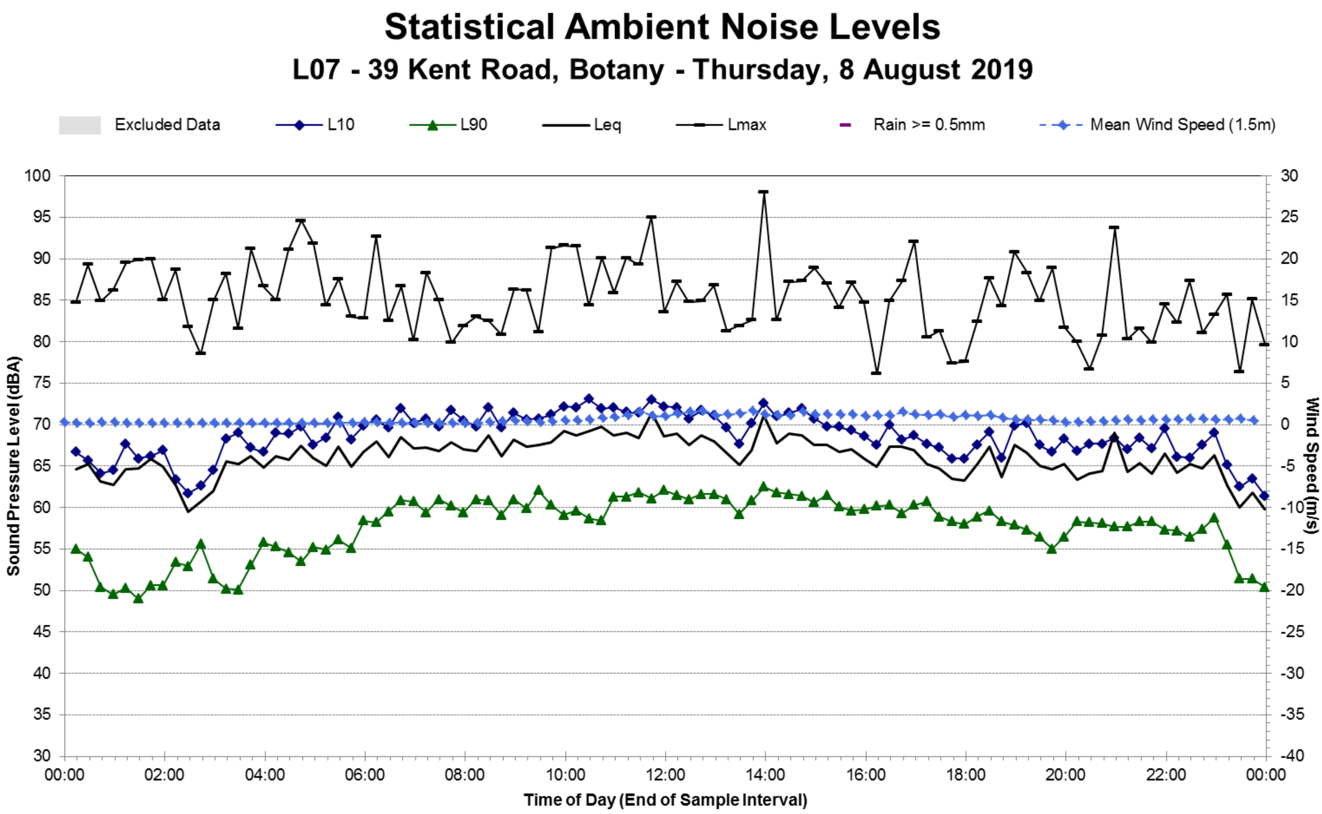
L07 - 39 Kent Road, Botany - Tuesday, 6 August 2019

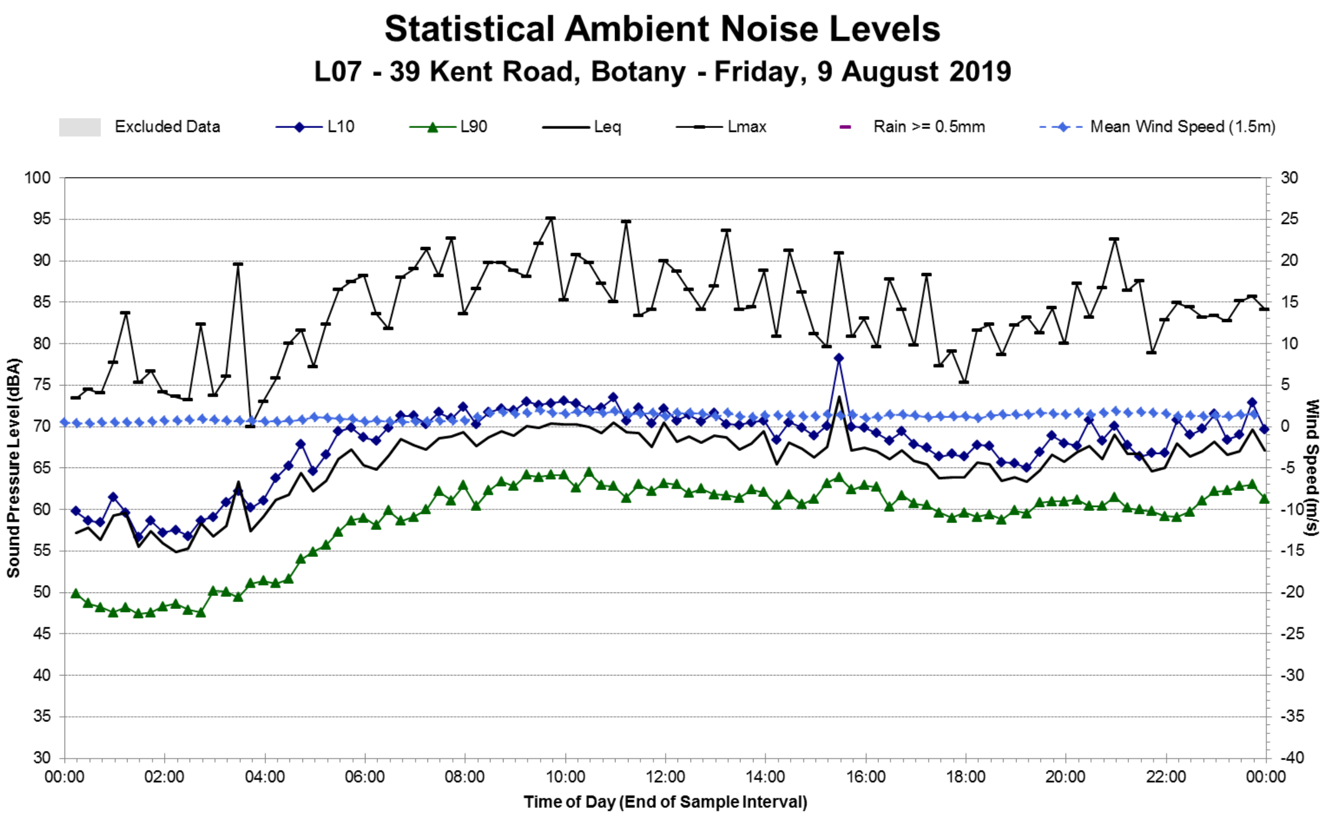


Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Wednesday, 7 August 2019

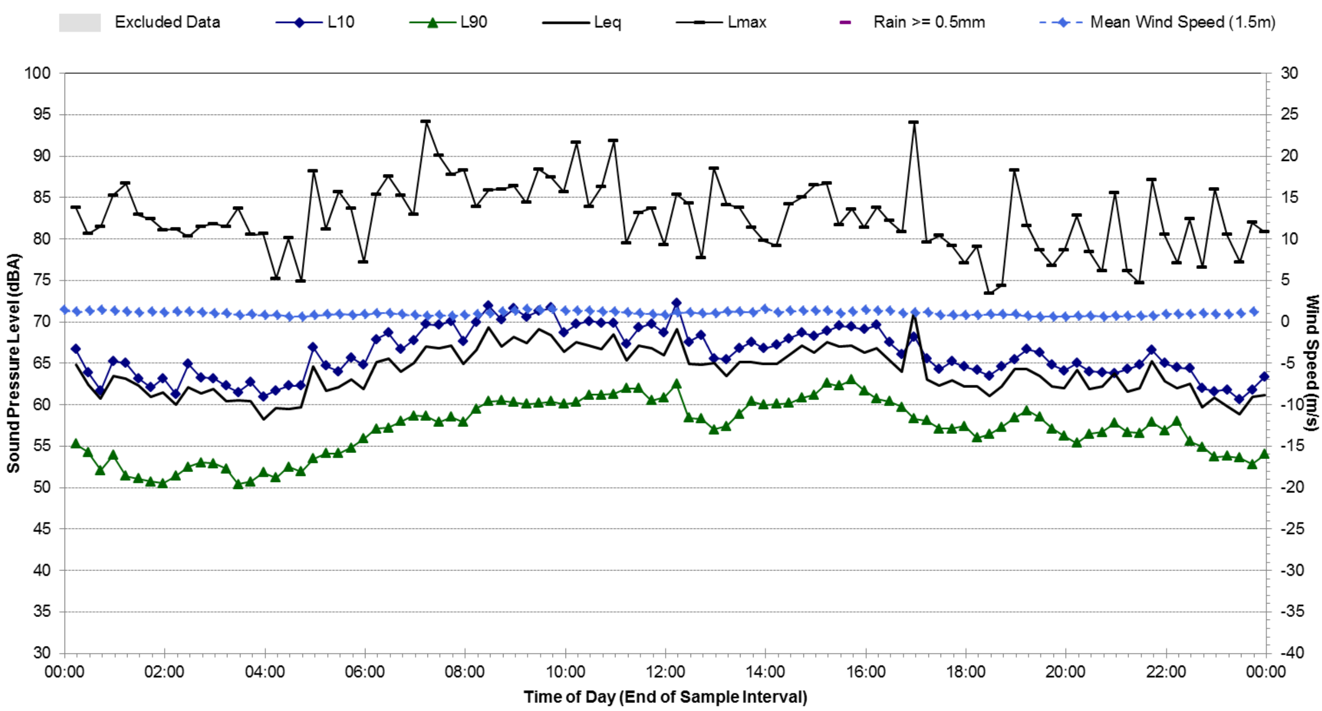



Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Thursday, 8 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L07 - 39 Kent Road, Botany - Friday, 9 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

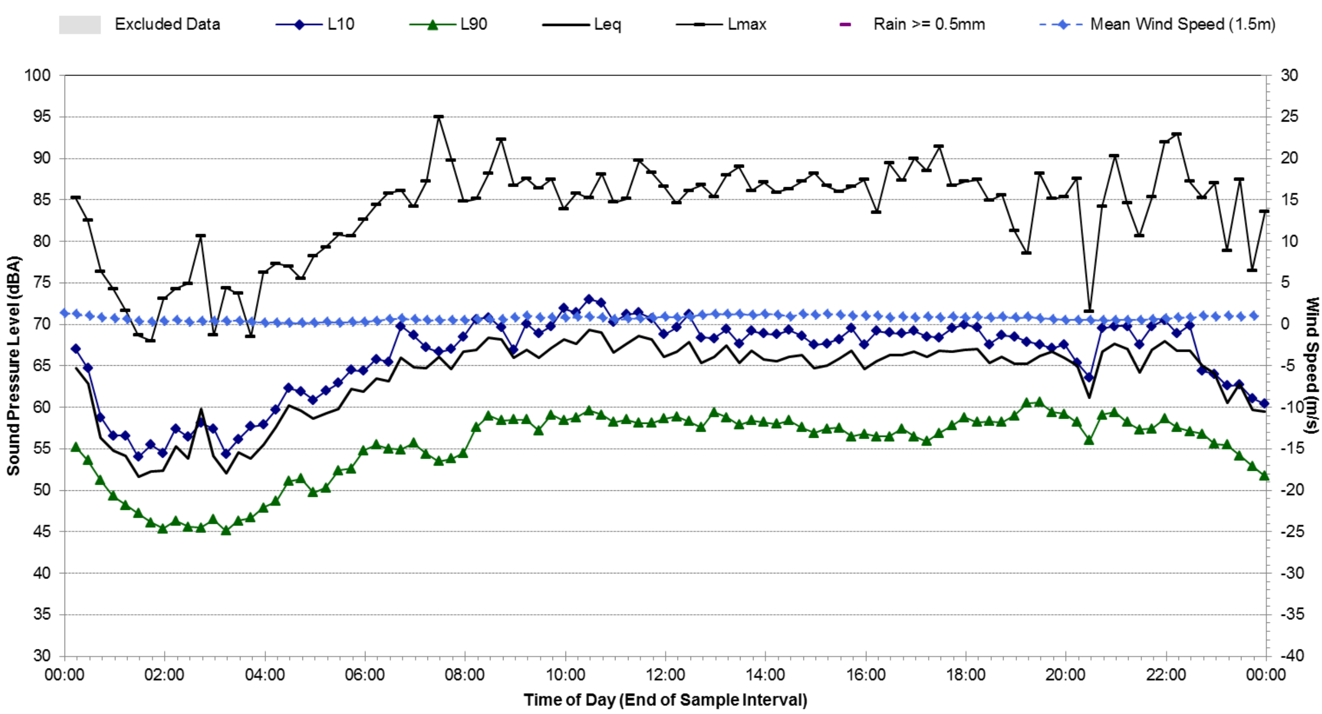
Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Saturday, 10 August 2019



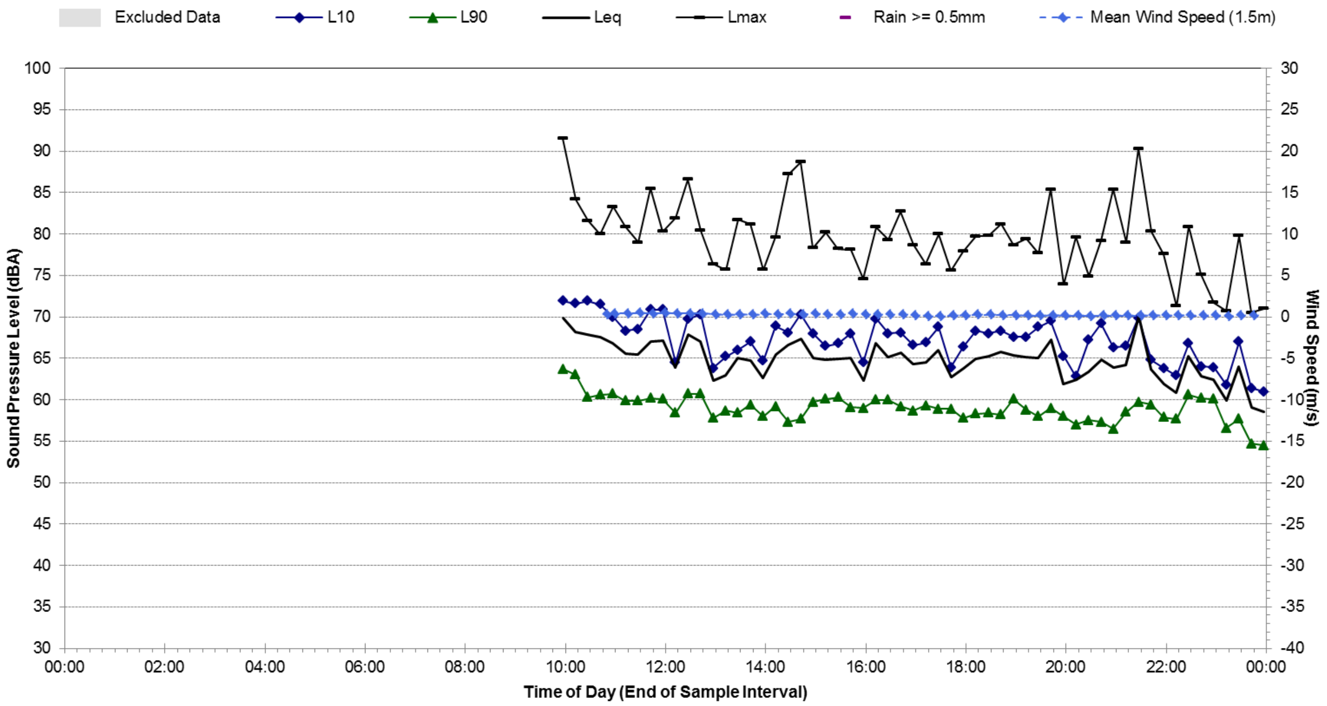
Statistical Ambient Noise Levels

L07 - 39 Kent Road, Botany - Sunday, 11 August 2019



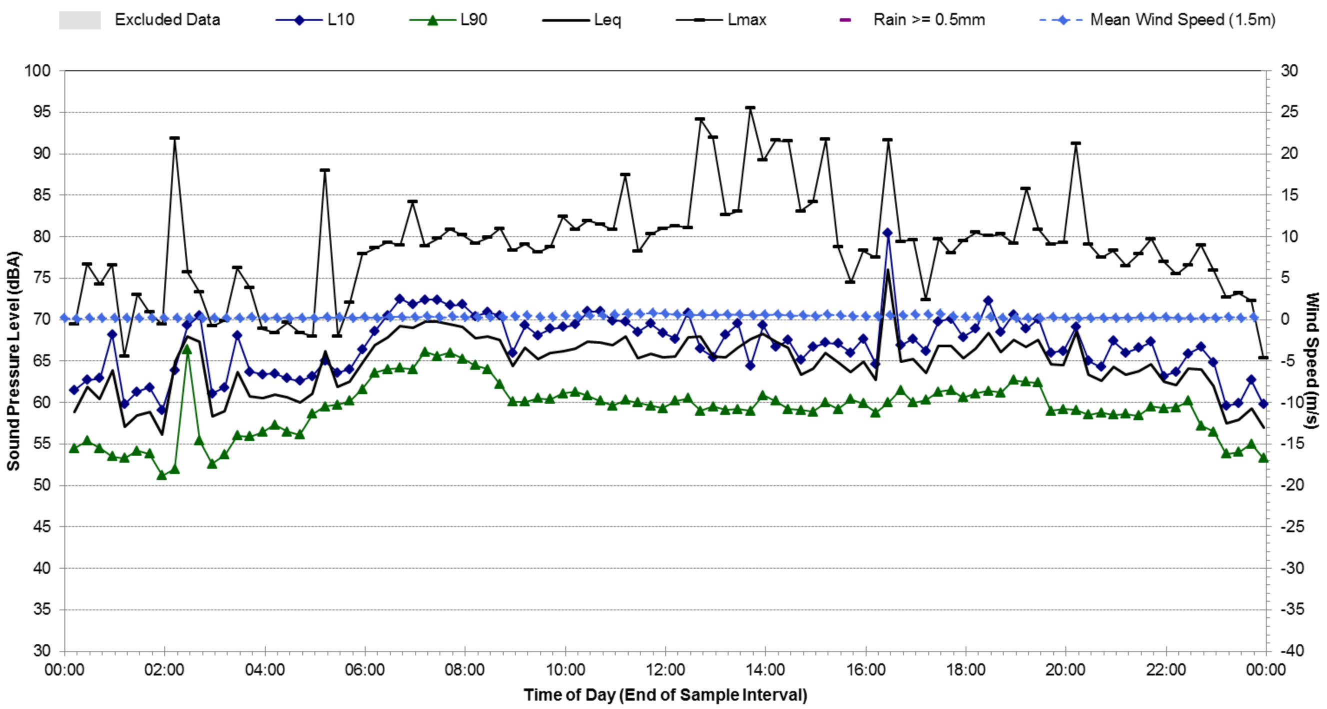
Statistical Ambient Noise Levels

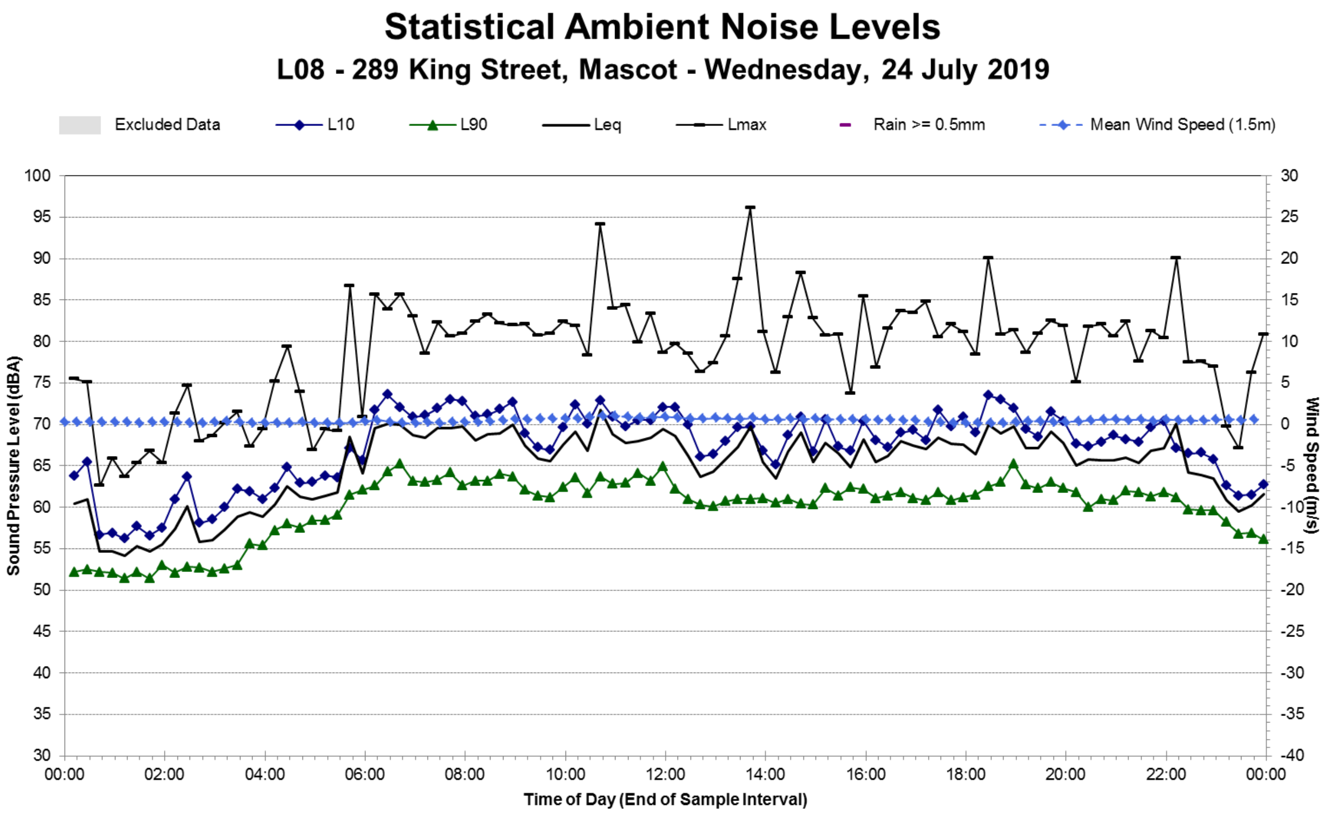
L08 - 289 King Street, Mascot - Monday, 22 July 2019

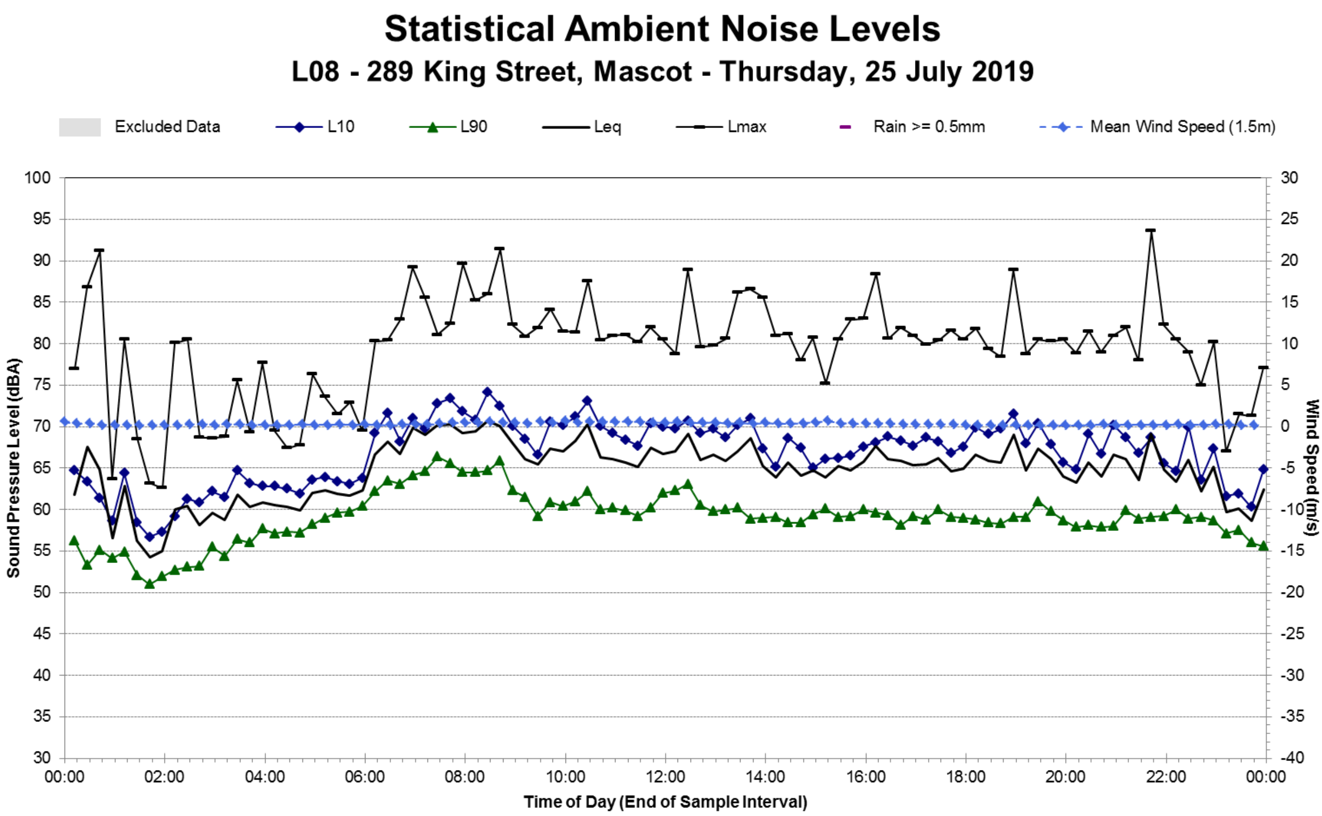


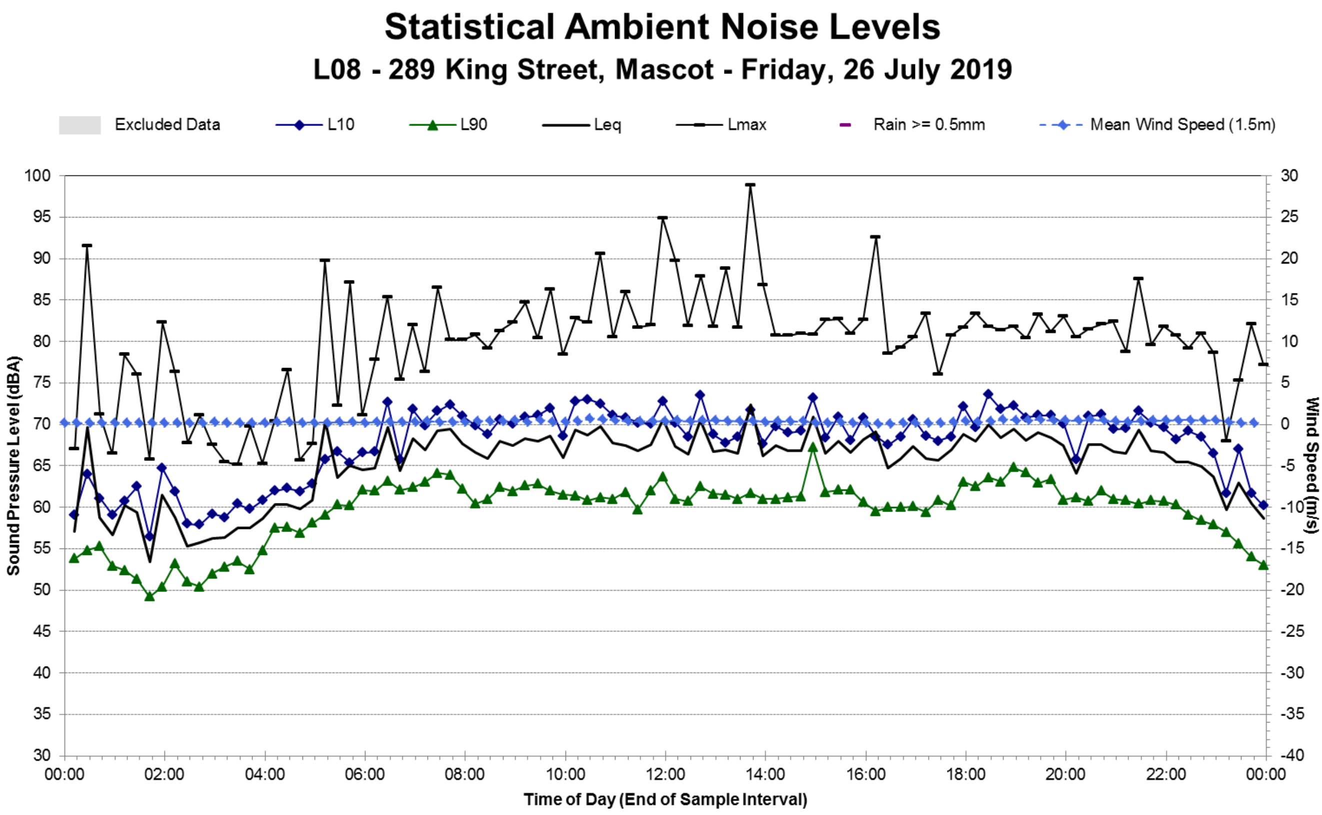
Statistical Ambient Noise Levels

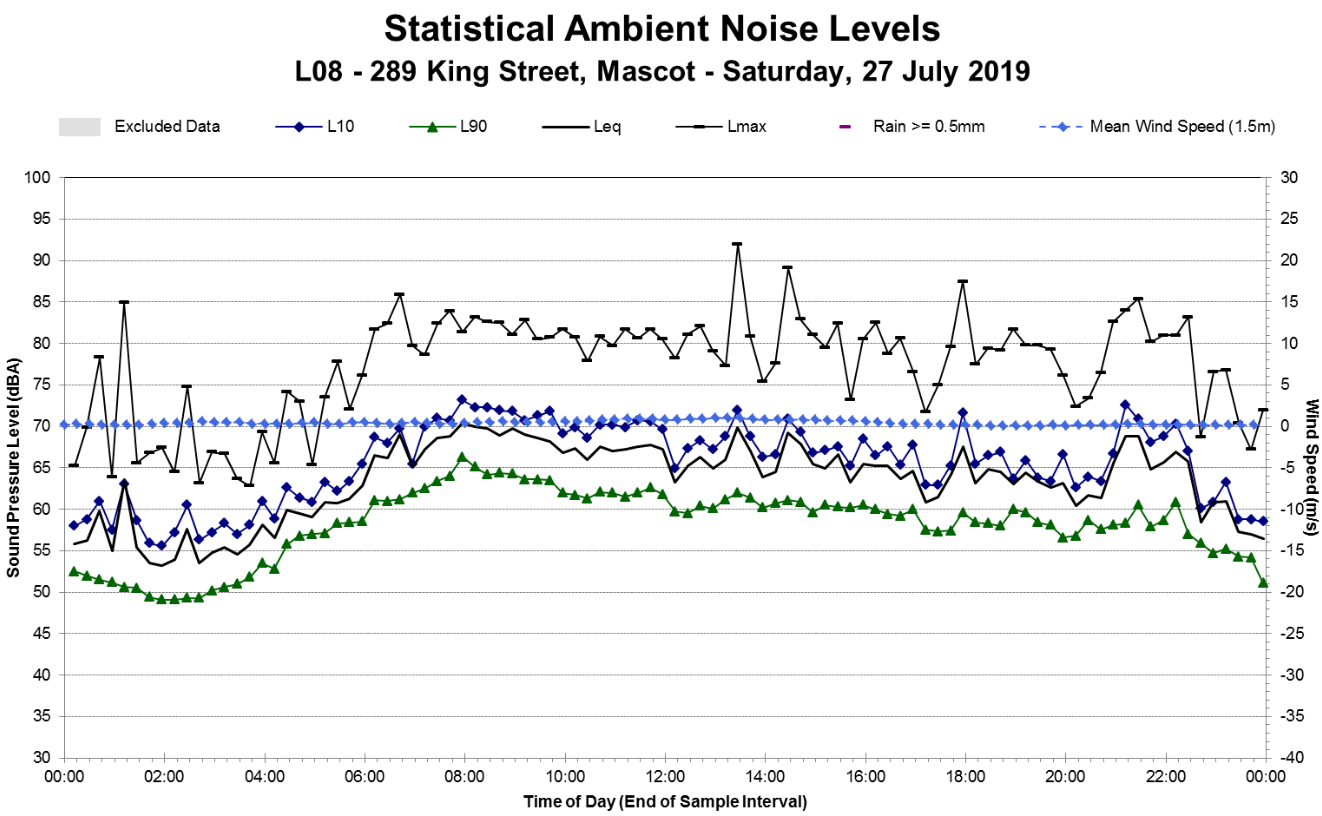
L08 - 289 King Street, Mascot - Tuesday, 23 July 2019




Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Wednesday, 24 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

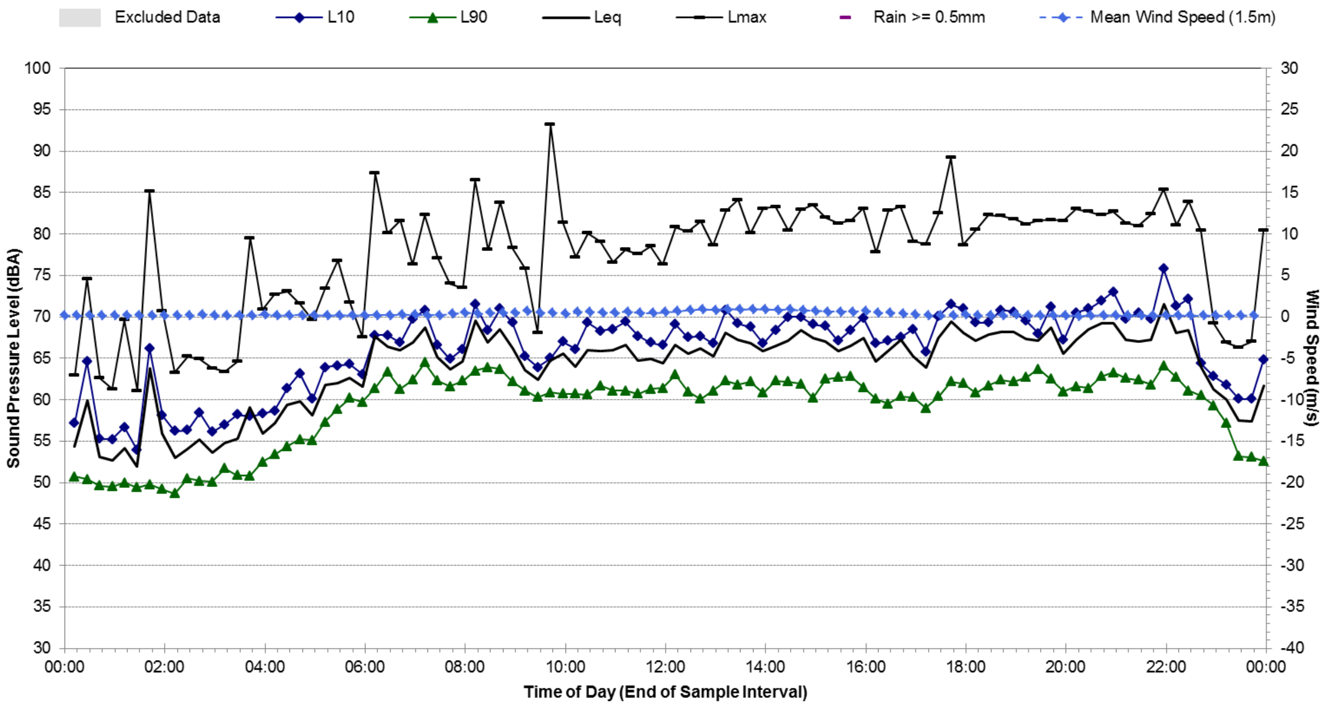

Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Friday, 26 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Saturday, 27 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

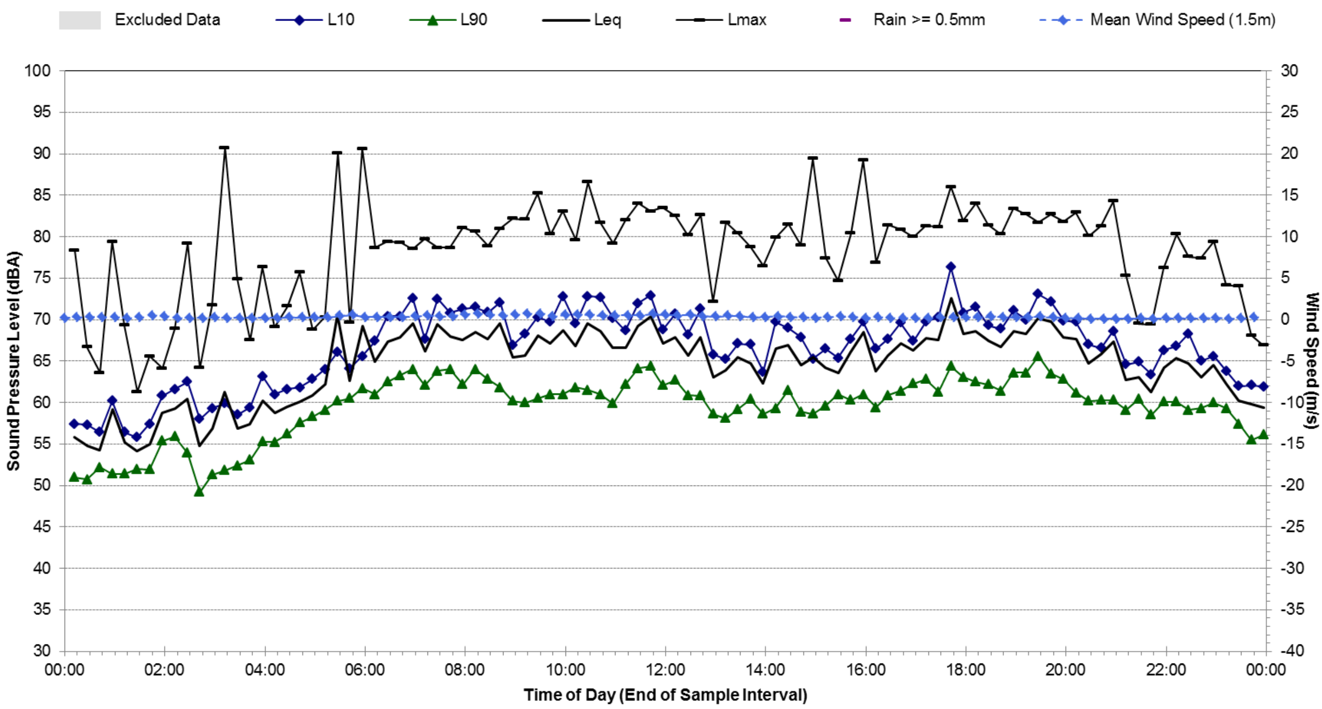
Statistical Ambient Noise Levels

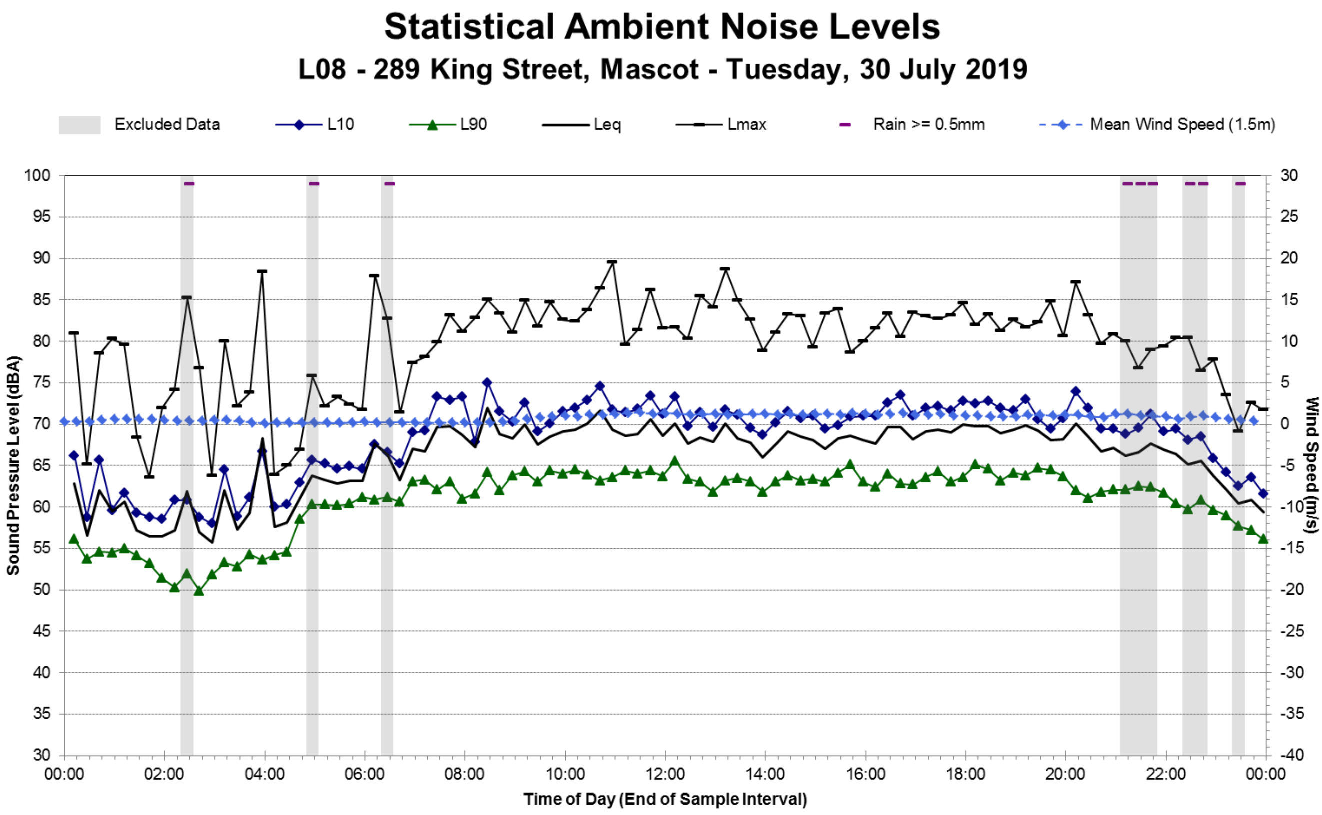
L08 - 289 King Street, Mascot - Sunday, 28 July 2019



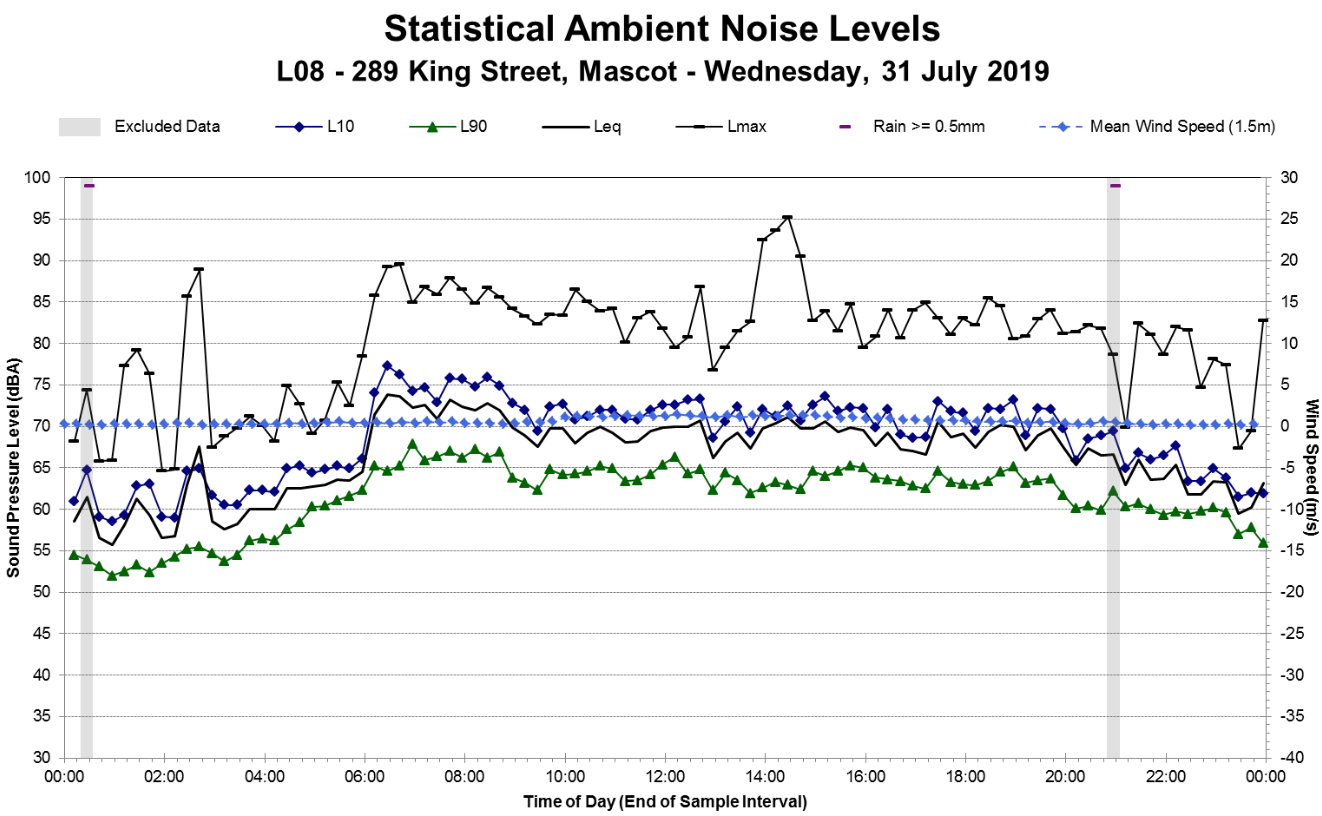
Statistical Ambient Noise Levels

L08 - 289 King Street, Mascot - Monday, 29 July 2019

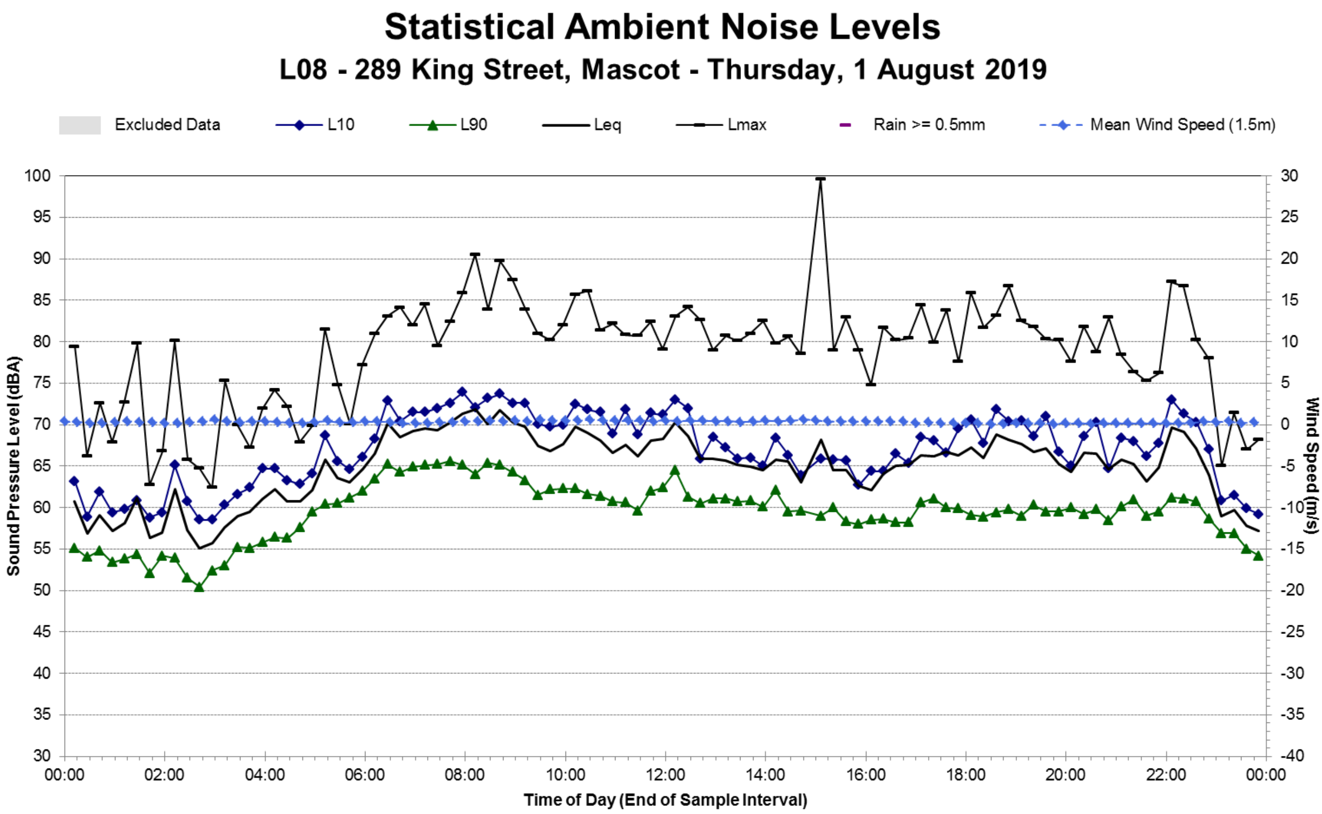




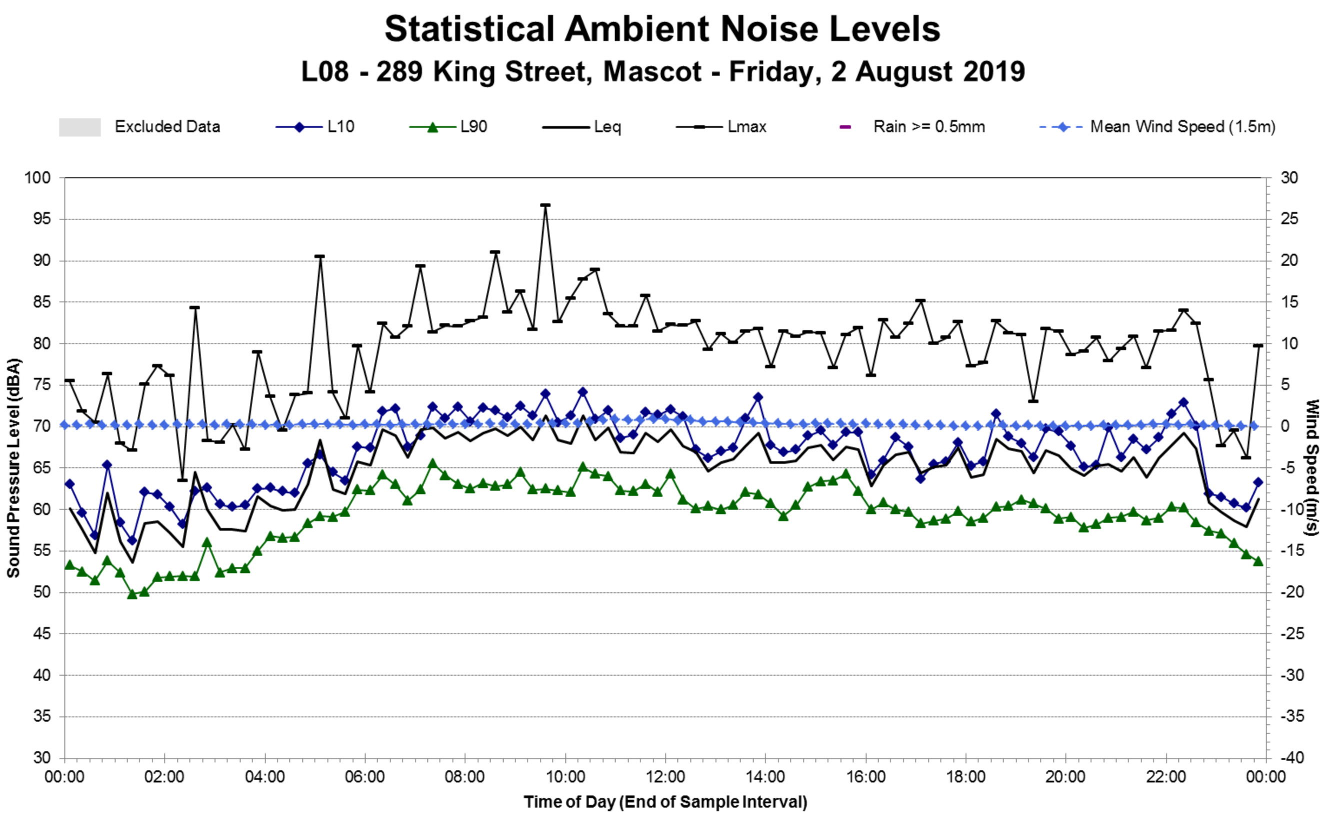
Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Tuesday, 30 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



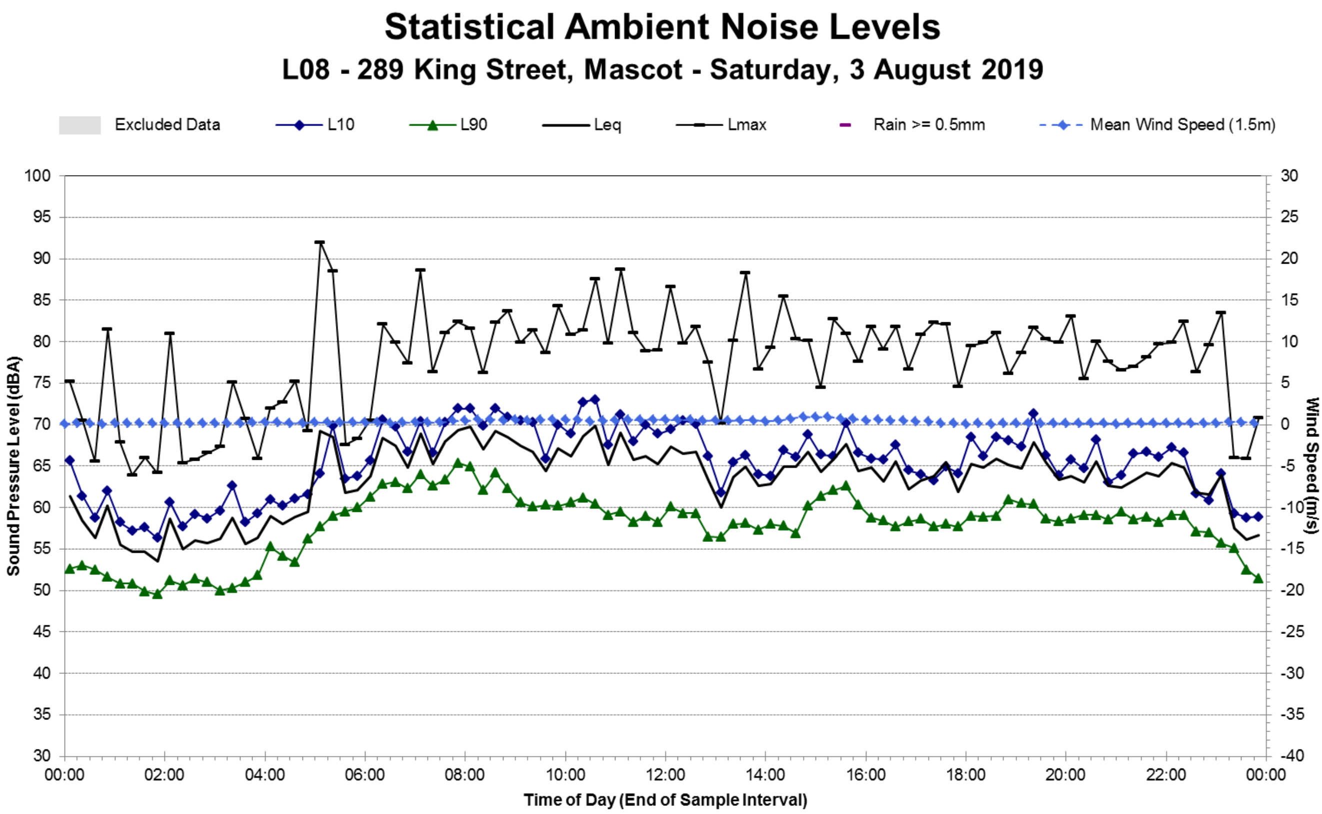
Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Wednesday, 31 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

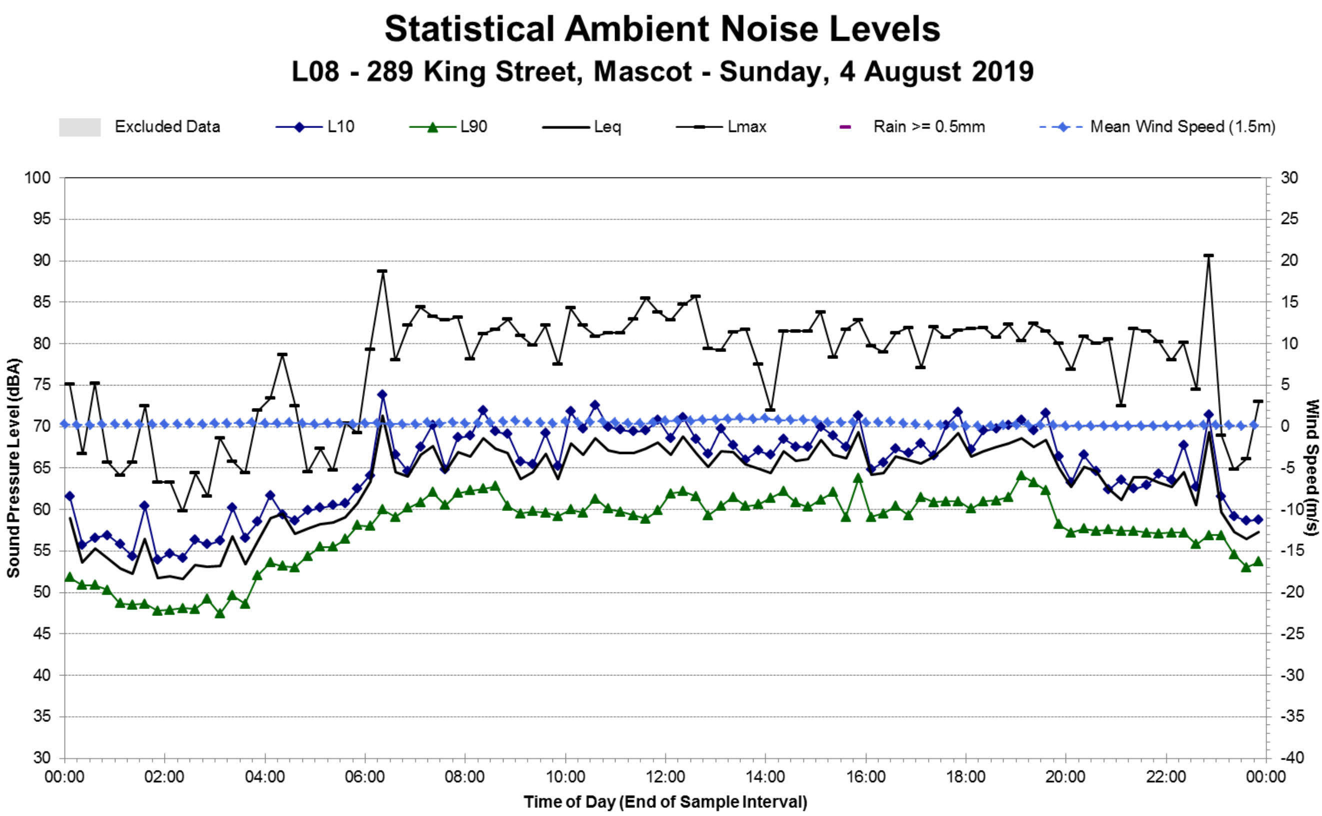


Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Thursday, 1 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

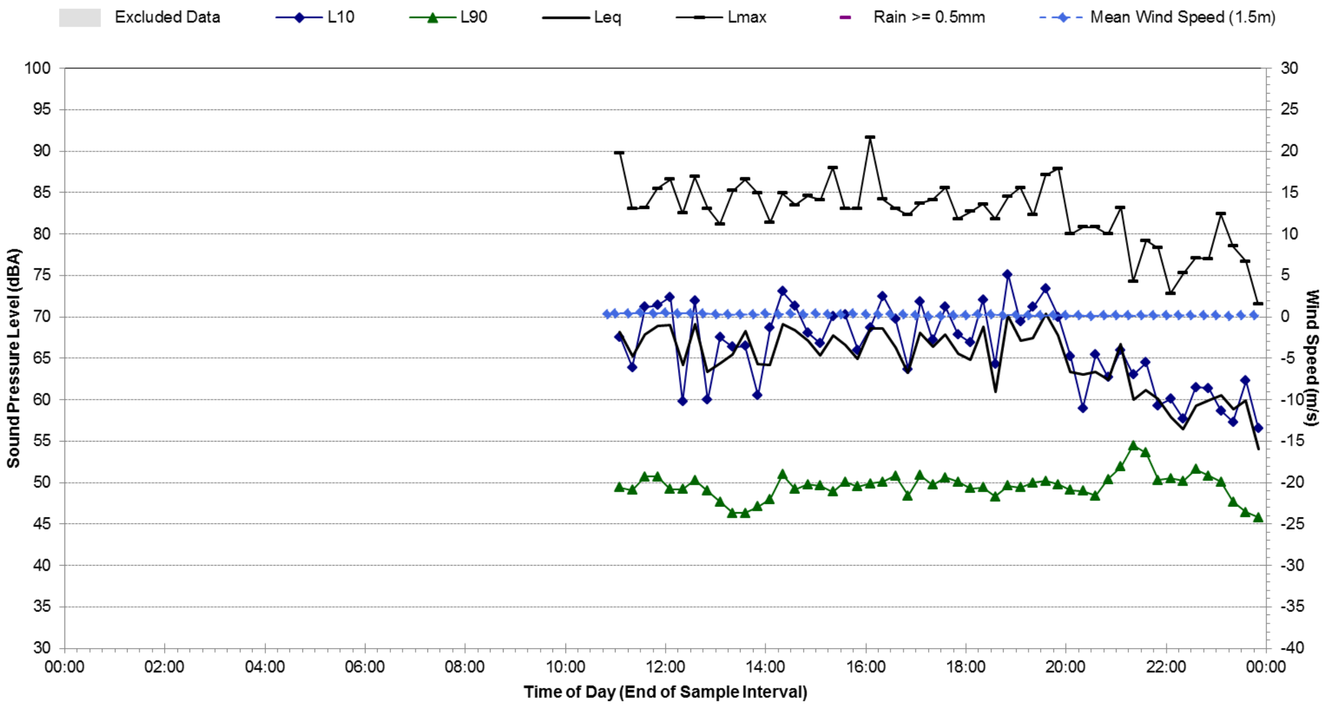


Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Friday, 2 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

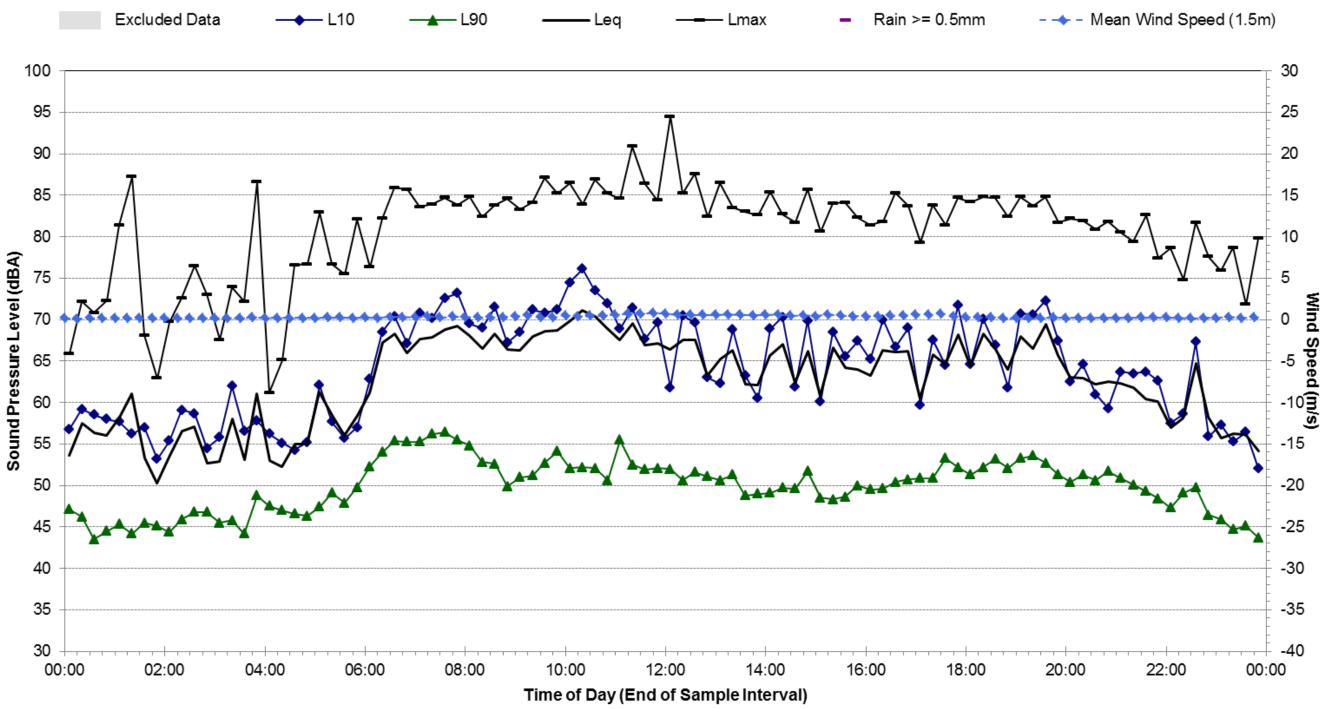

Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Saturday, 3 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

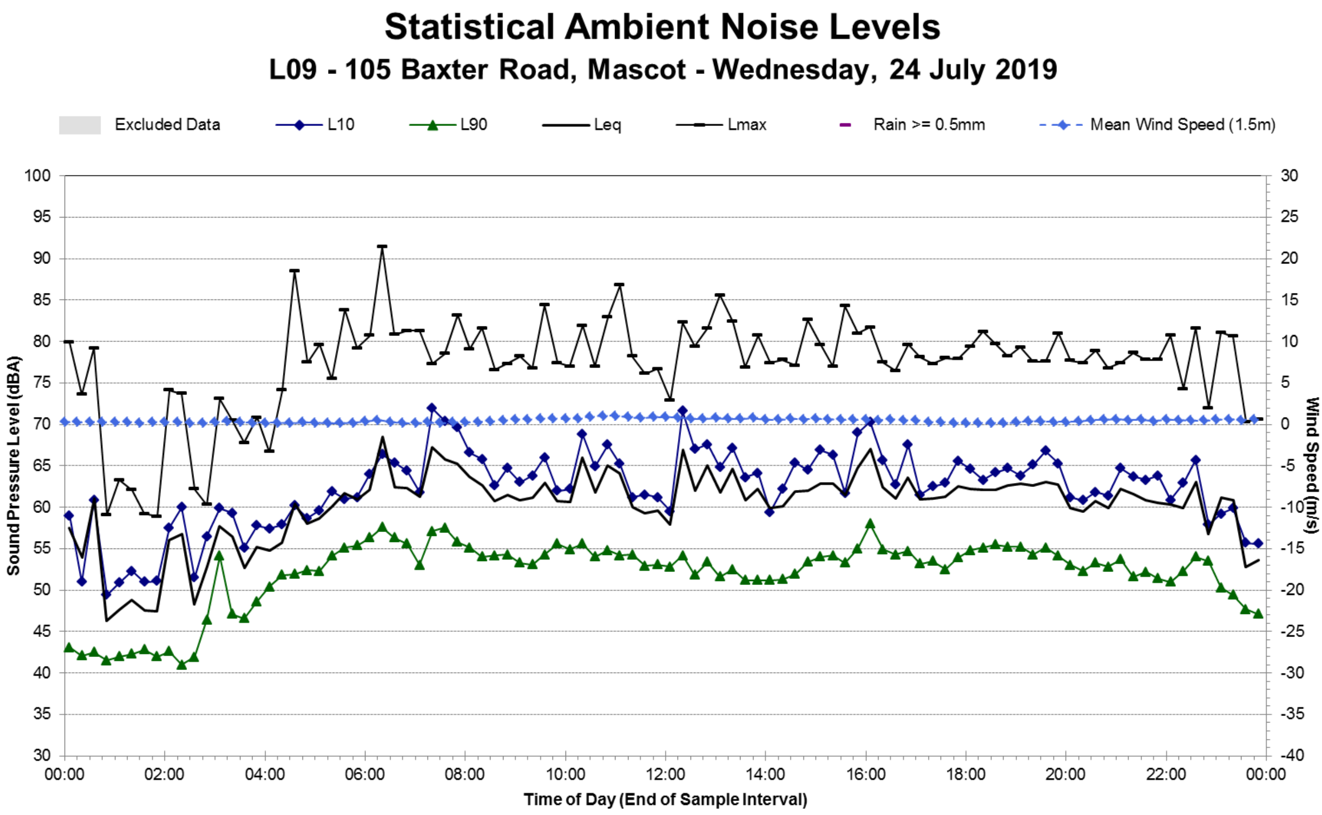

Statistical Ambient Noise Levels
L08 - 289 King Street, Mascot - Sunday, 4 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

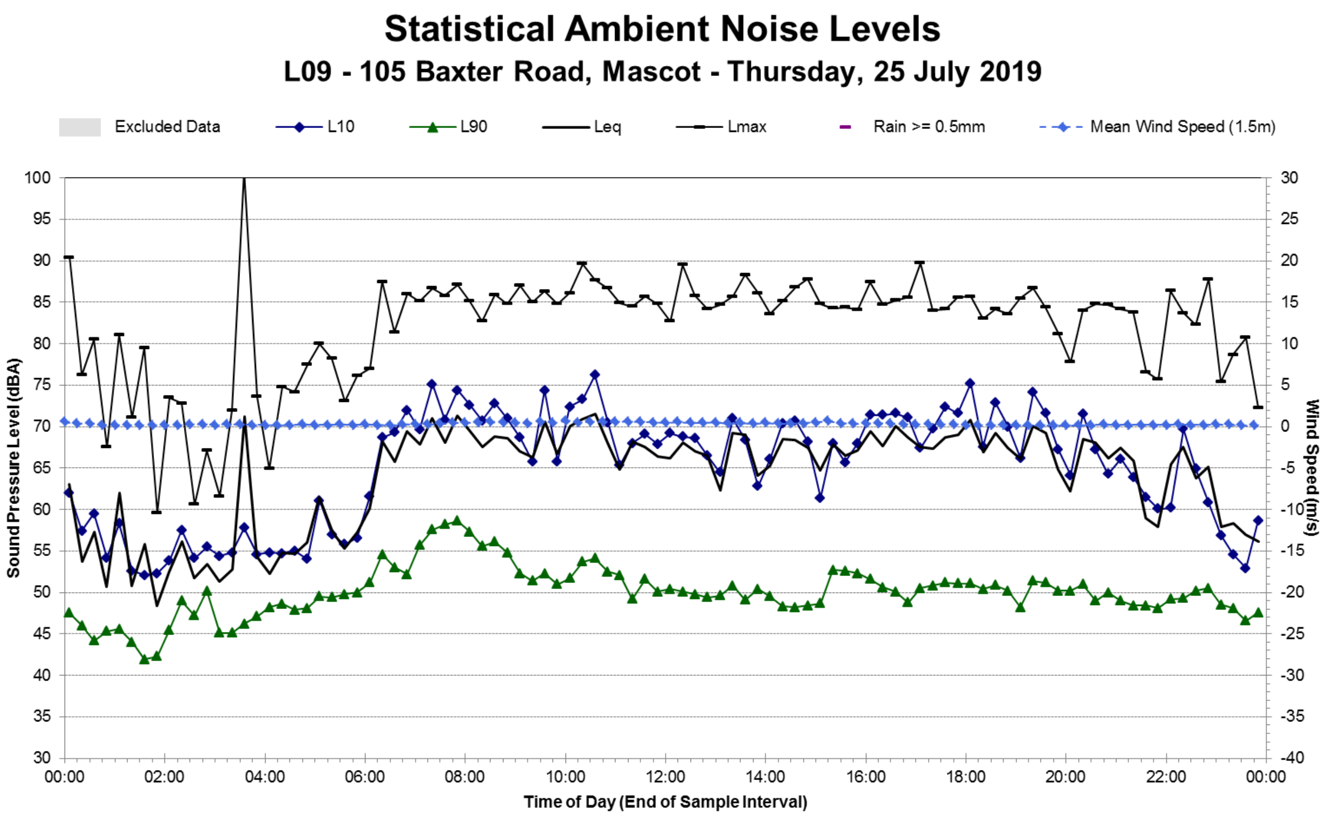
Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Monday, 22 July 2019



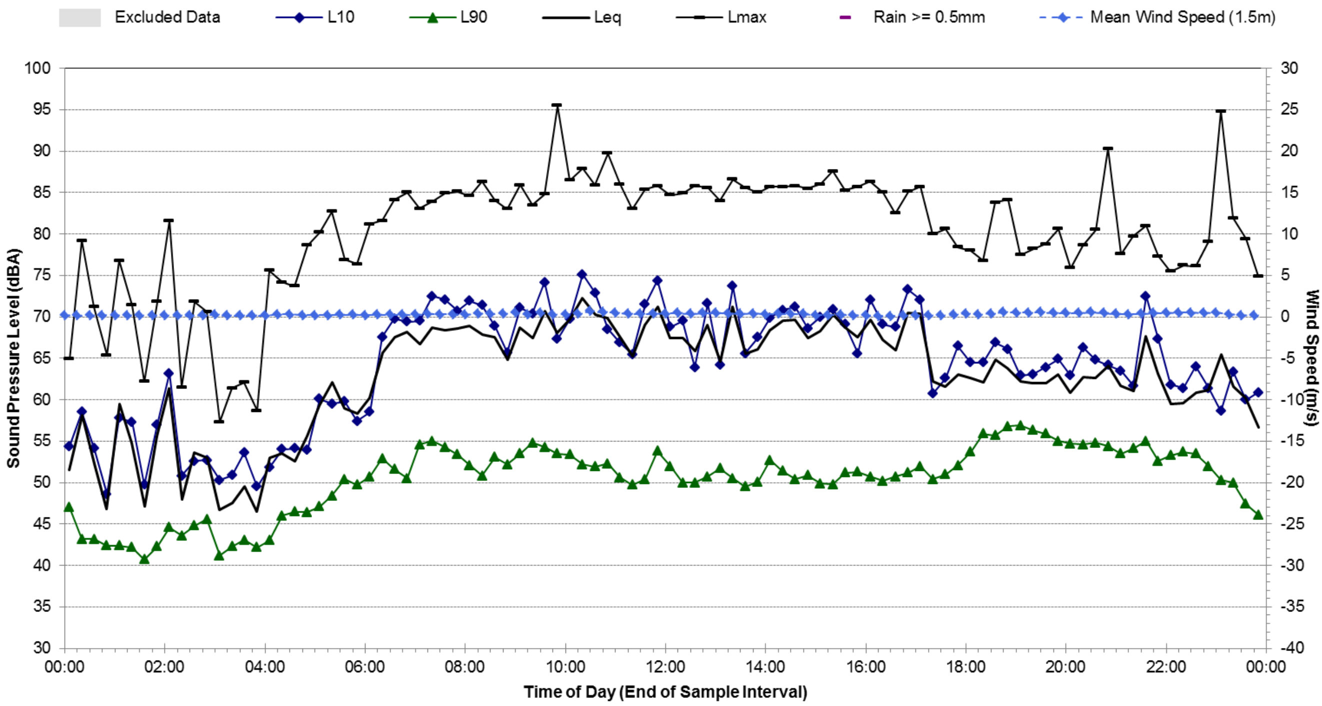
Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Tuesday, 23 July 2019



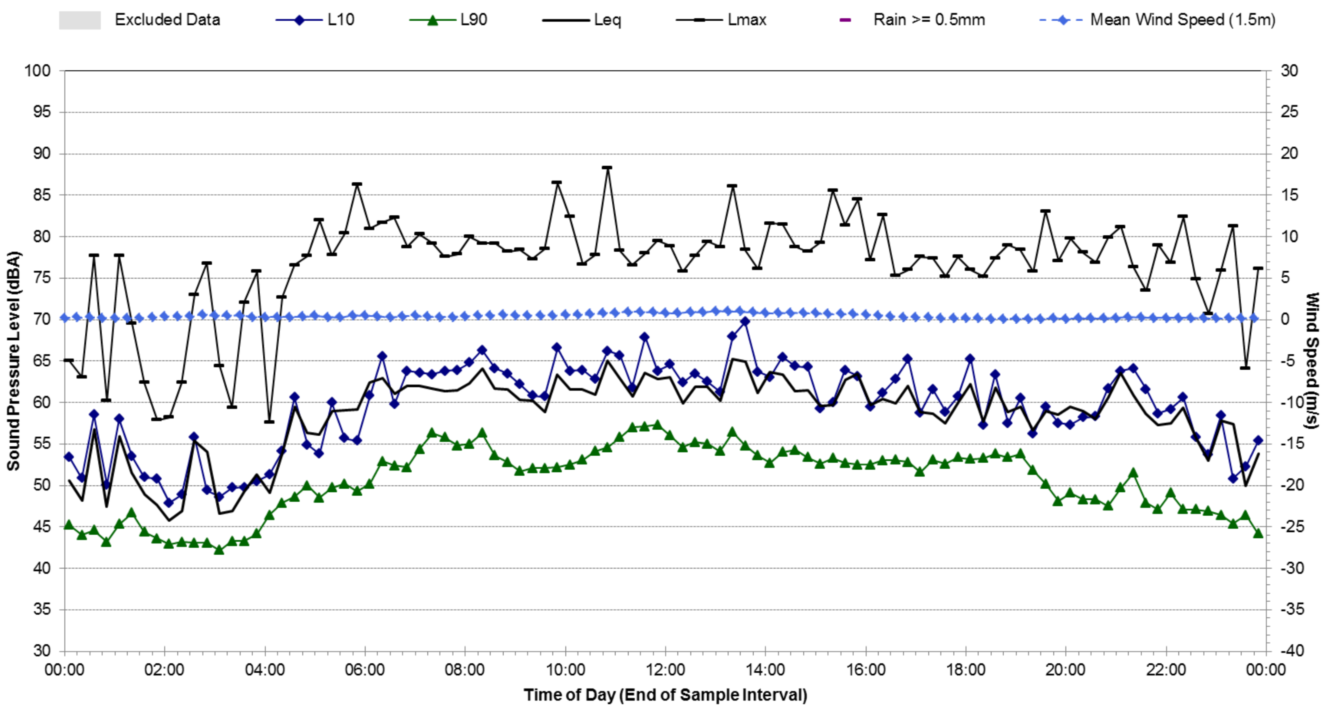

Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Wednesday, 24 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

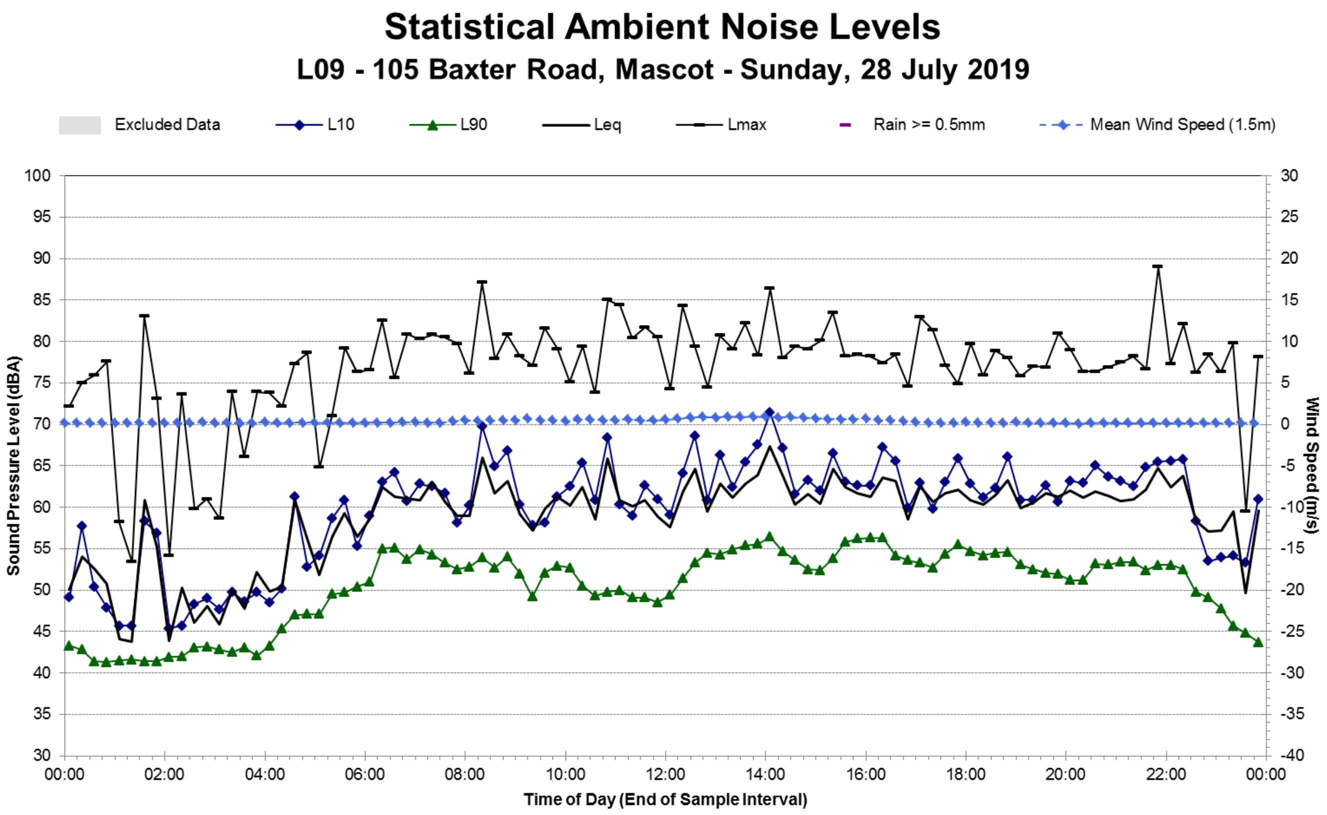

Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Thursday, 25 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

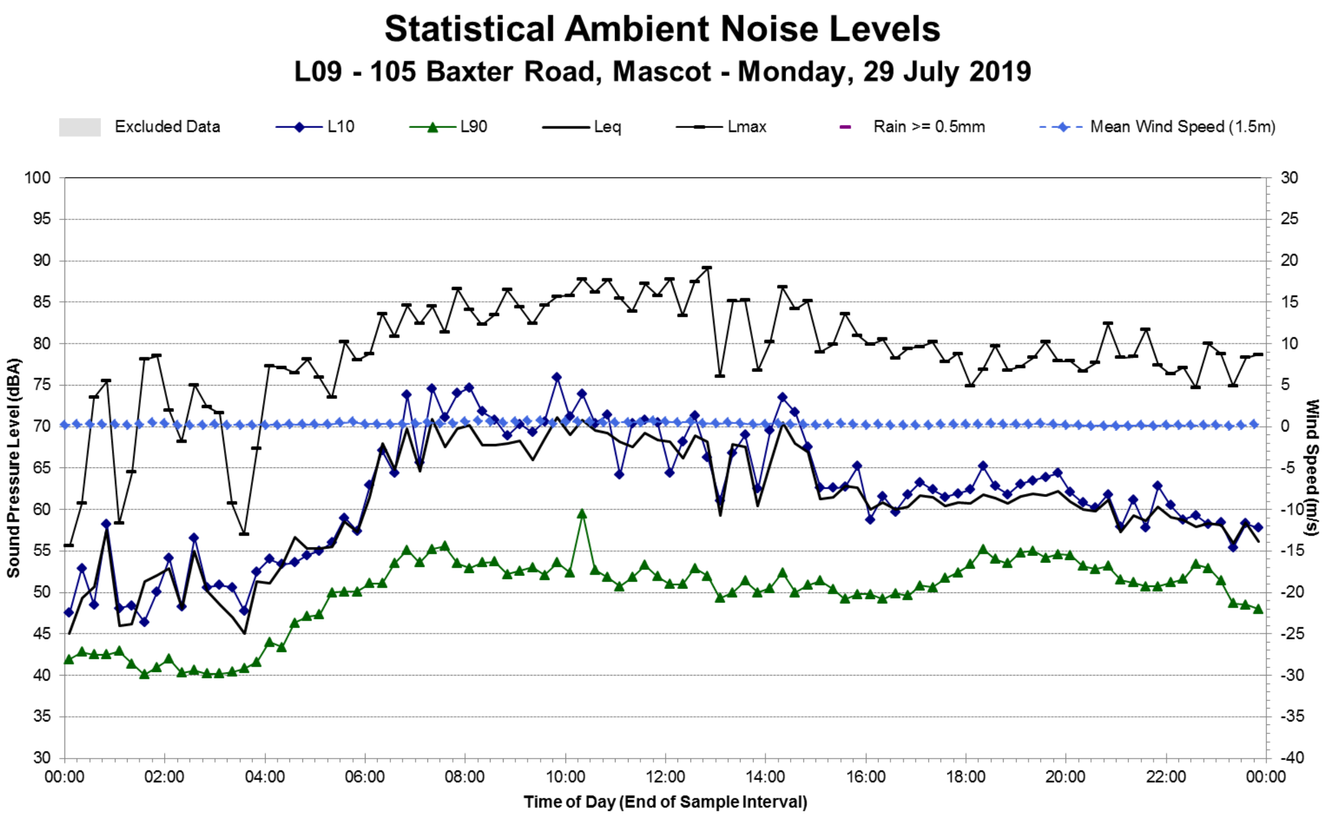
Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Friday, 26 July 2019

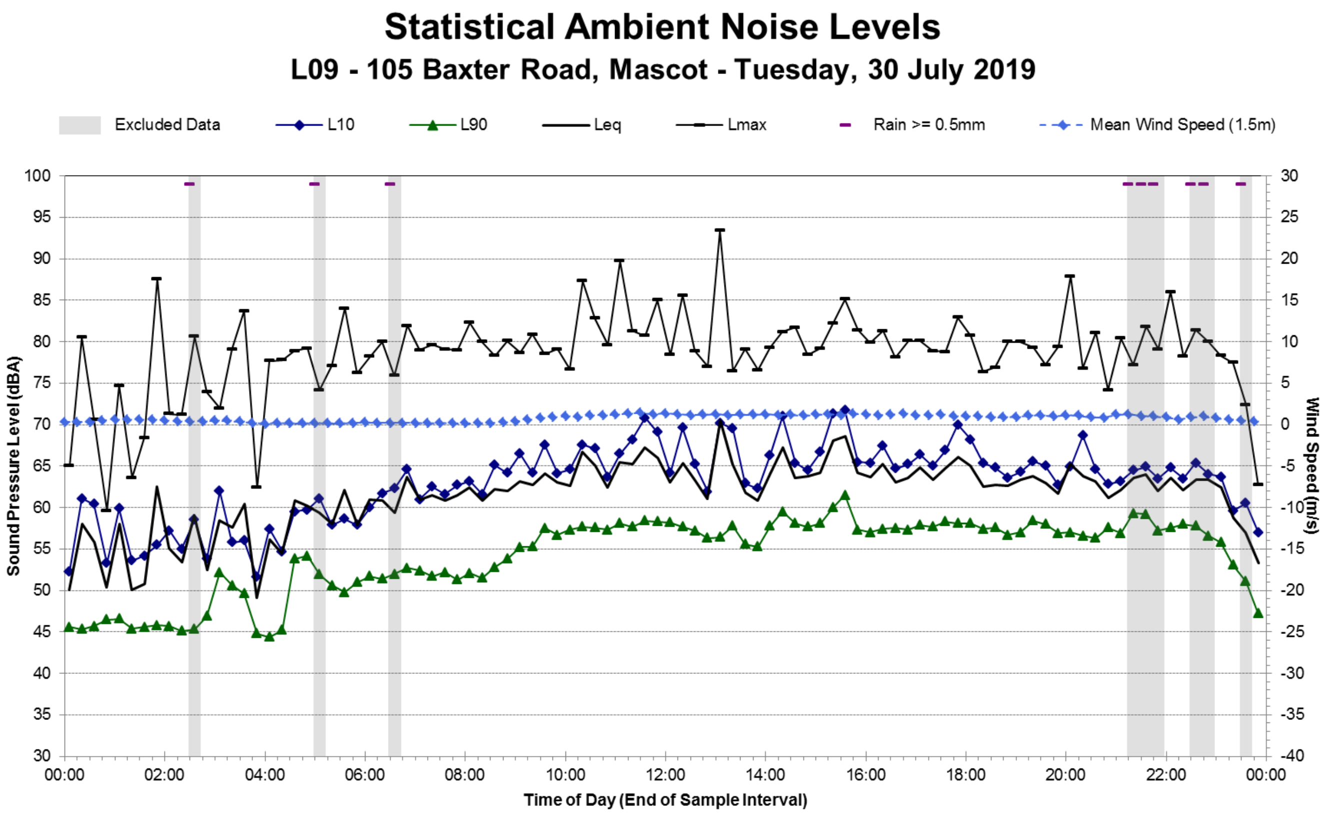


Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Saturday, 27 July 2019

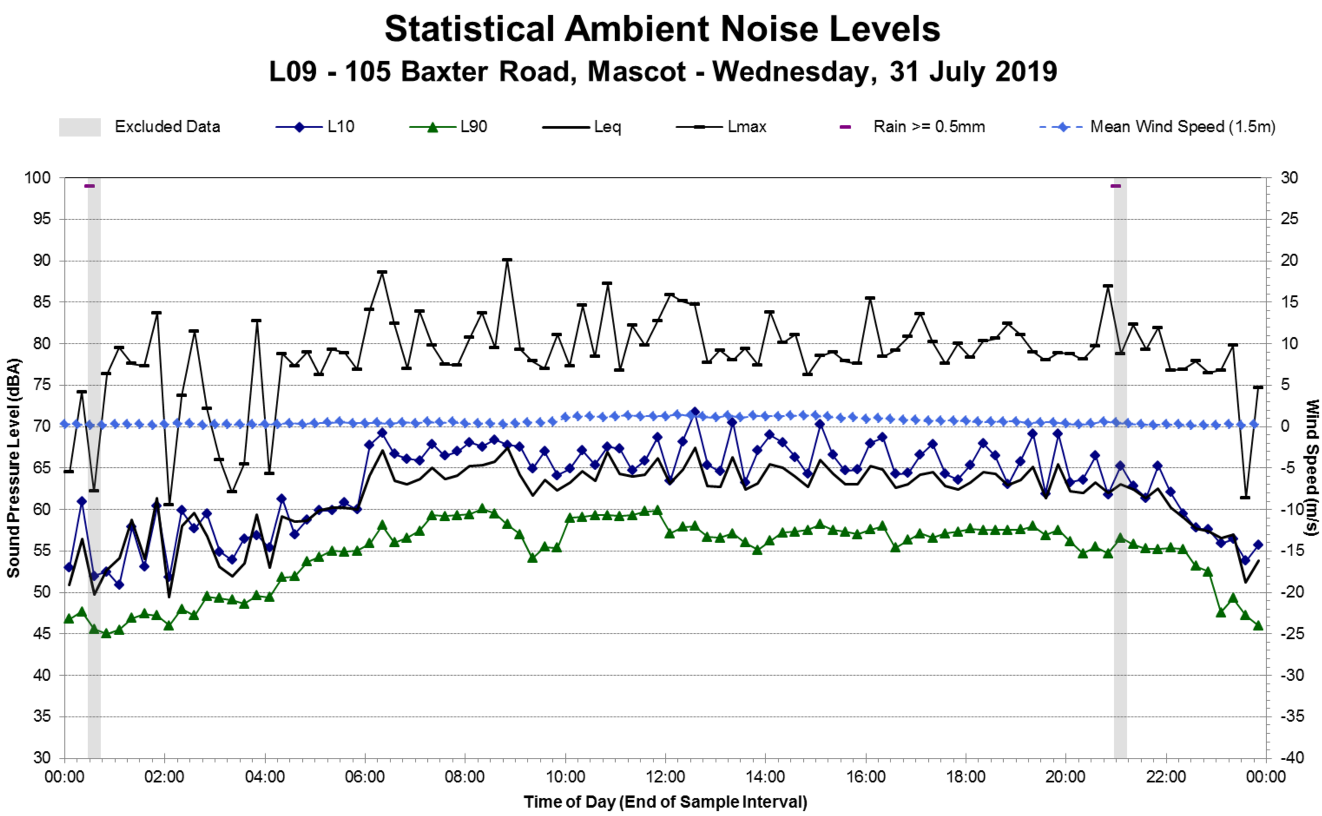



Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Sunday, 28 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

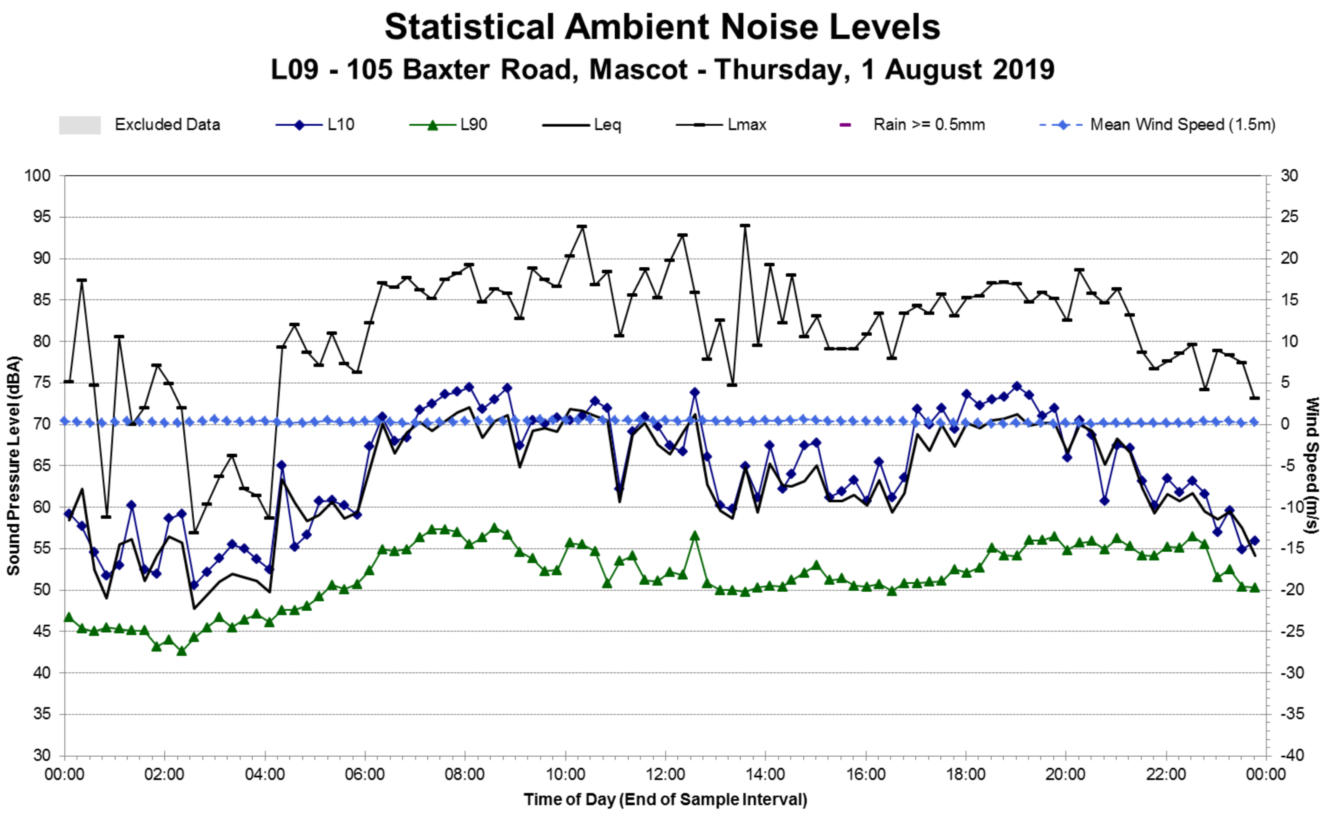

Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Monday, 29 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



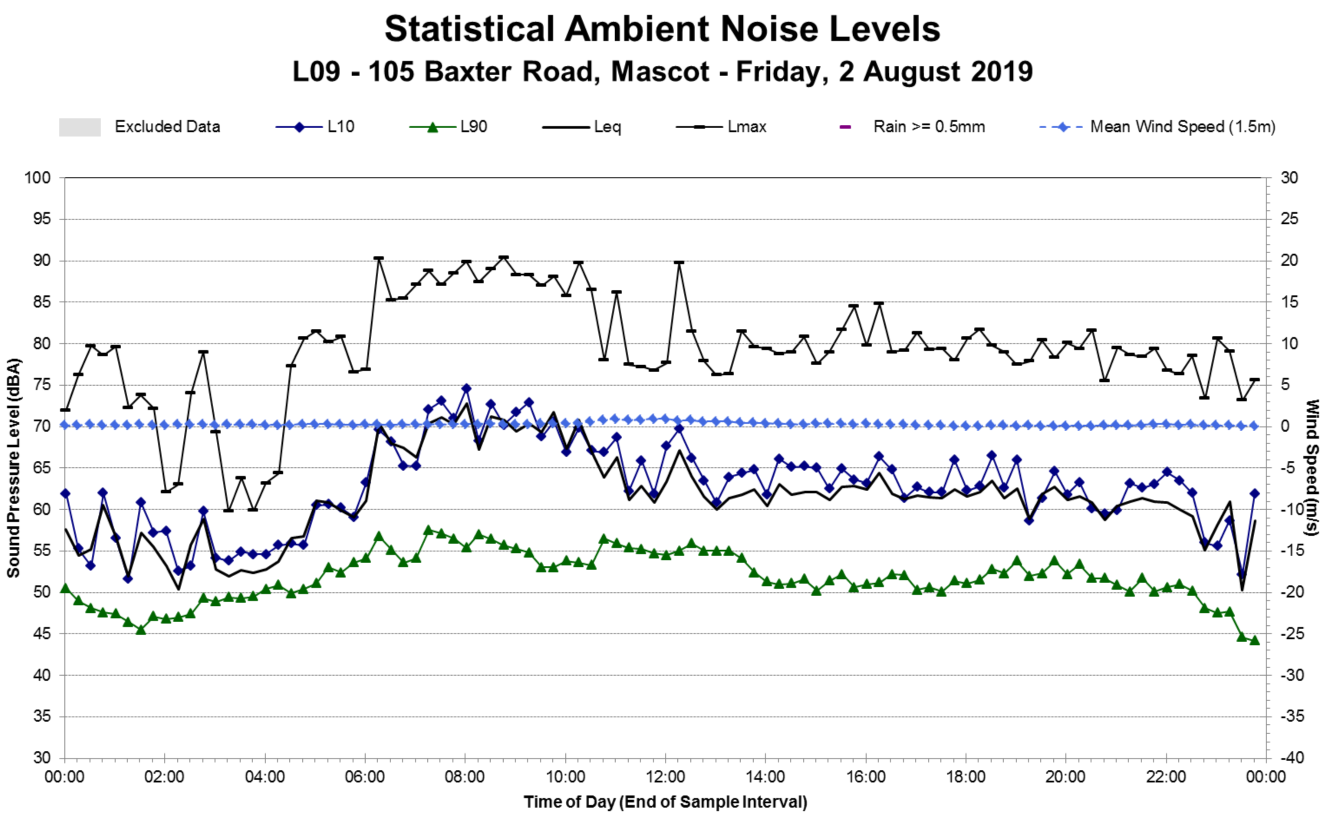
Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Tuesday, 30 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Wednesday, 31 July 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



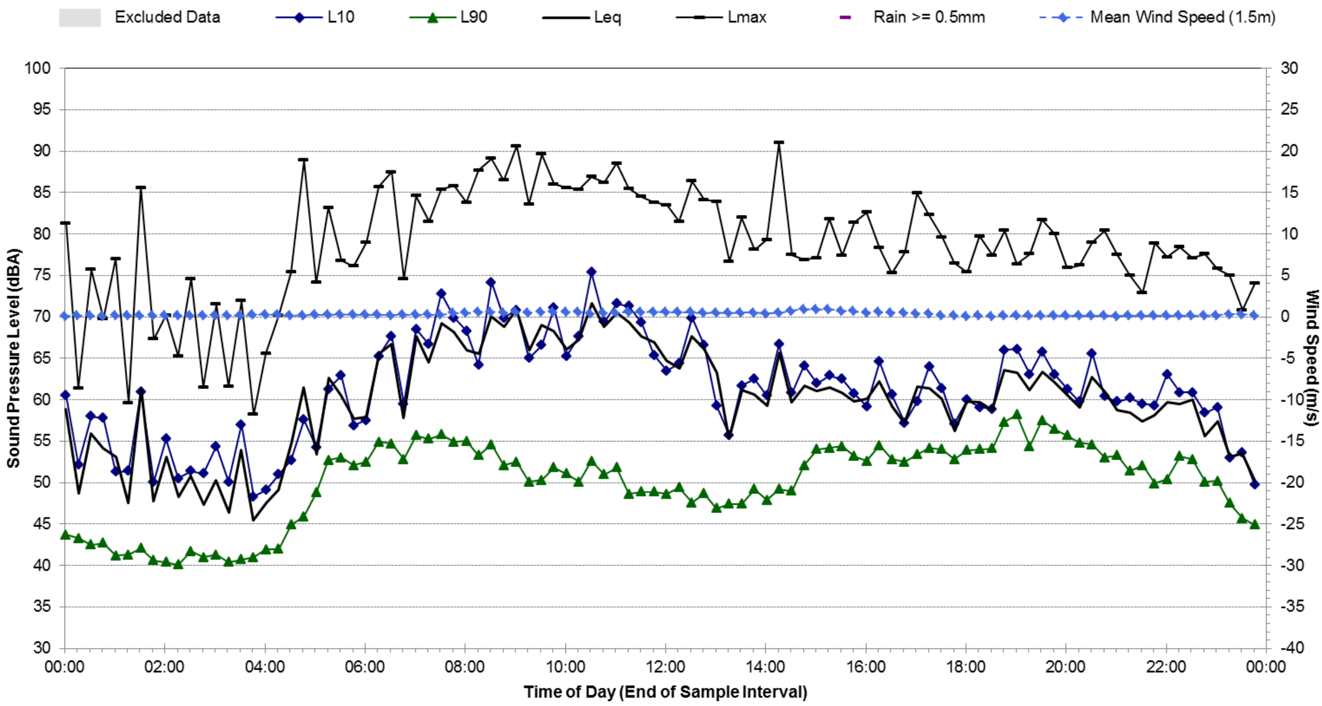
Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Thursday, 1 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00



Statistical Ambient Noise Levels
L09 - 105 Baxter Road, Mascot - Friday, 2 August 2019
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00

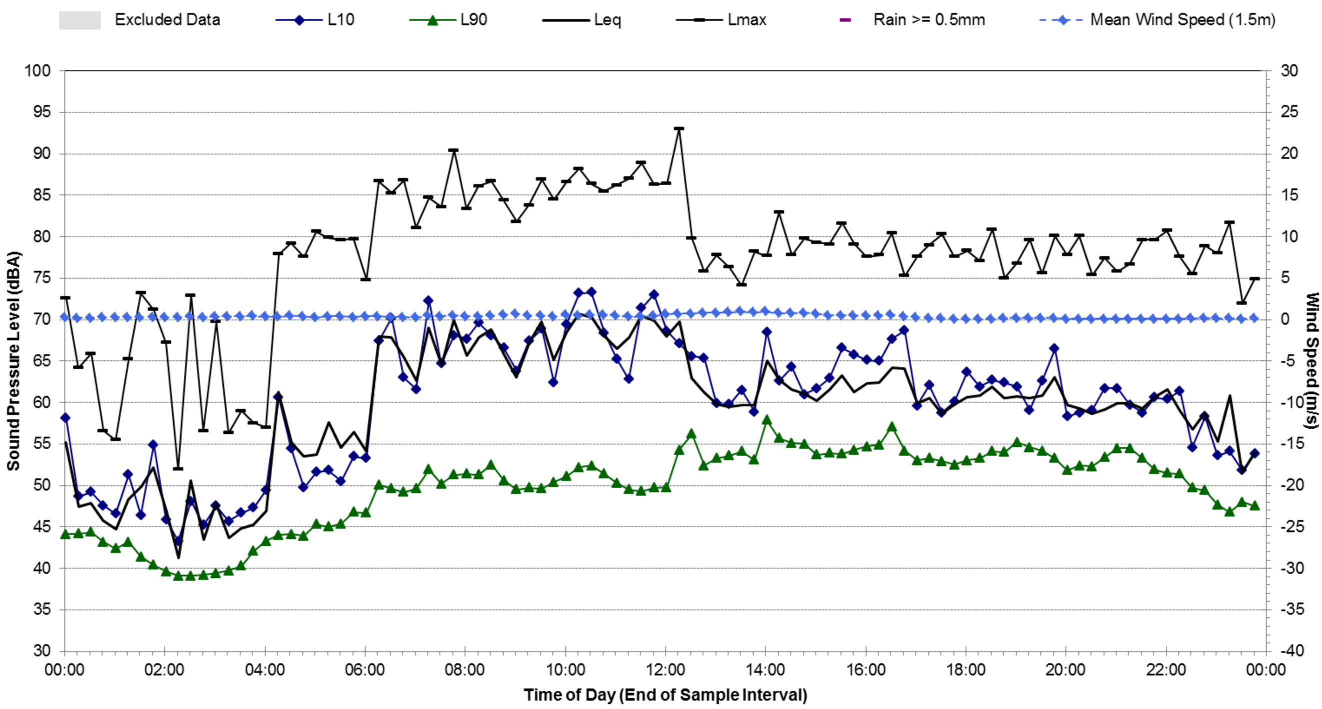
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Saturday, 3 August 2019



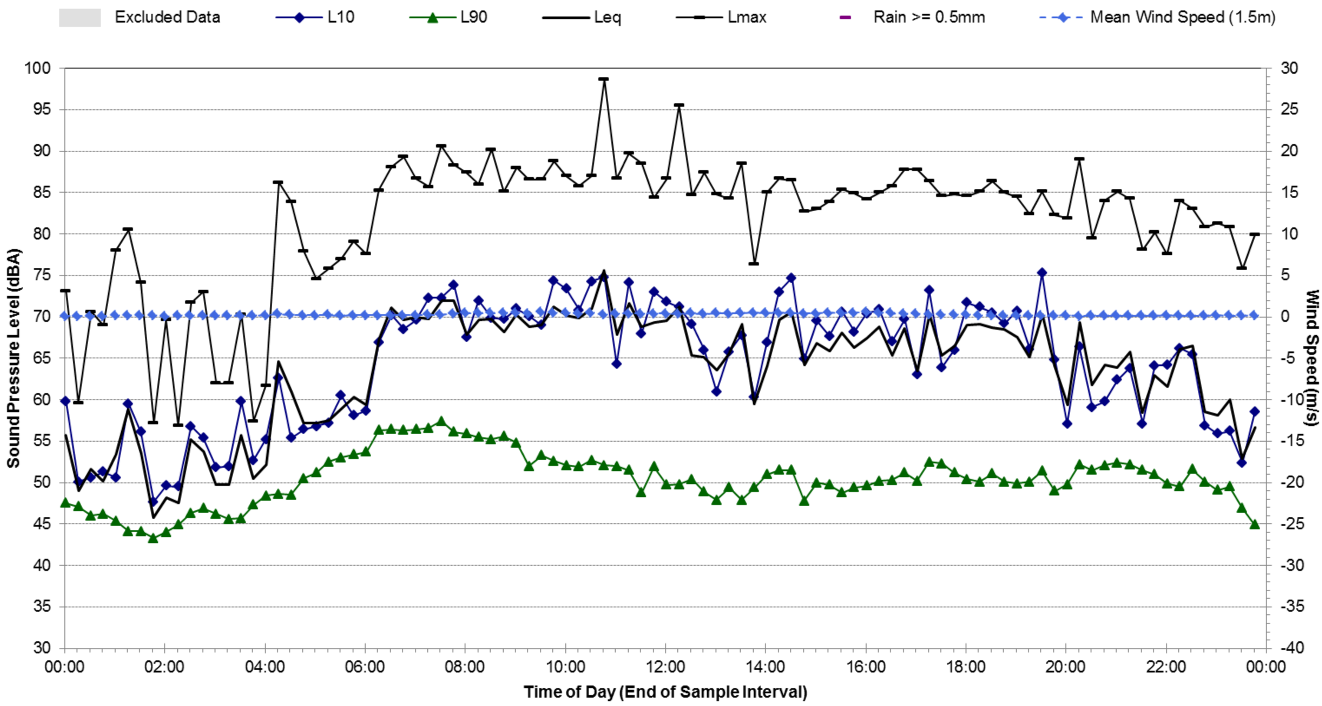
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Sunday, 4 August 2019



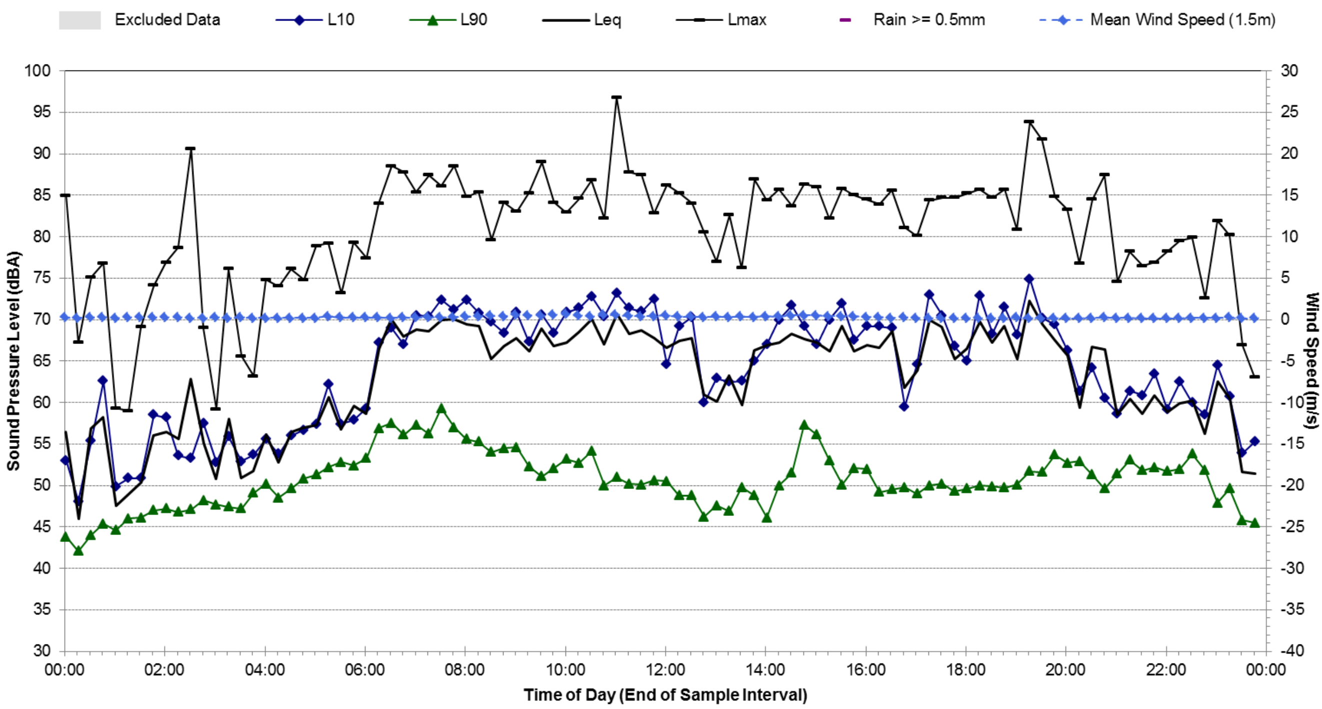
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Monday, 5 August 2019



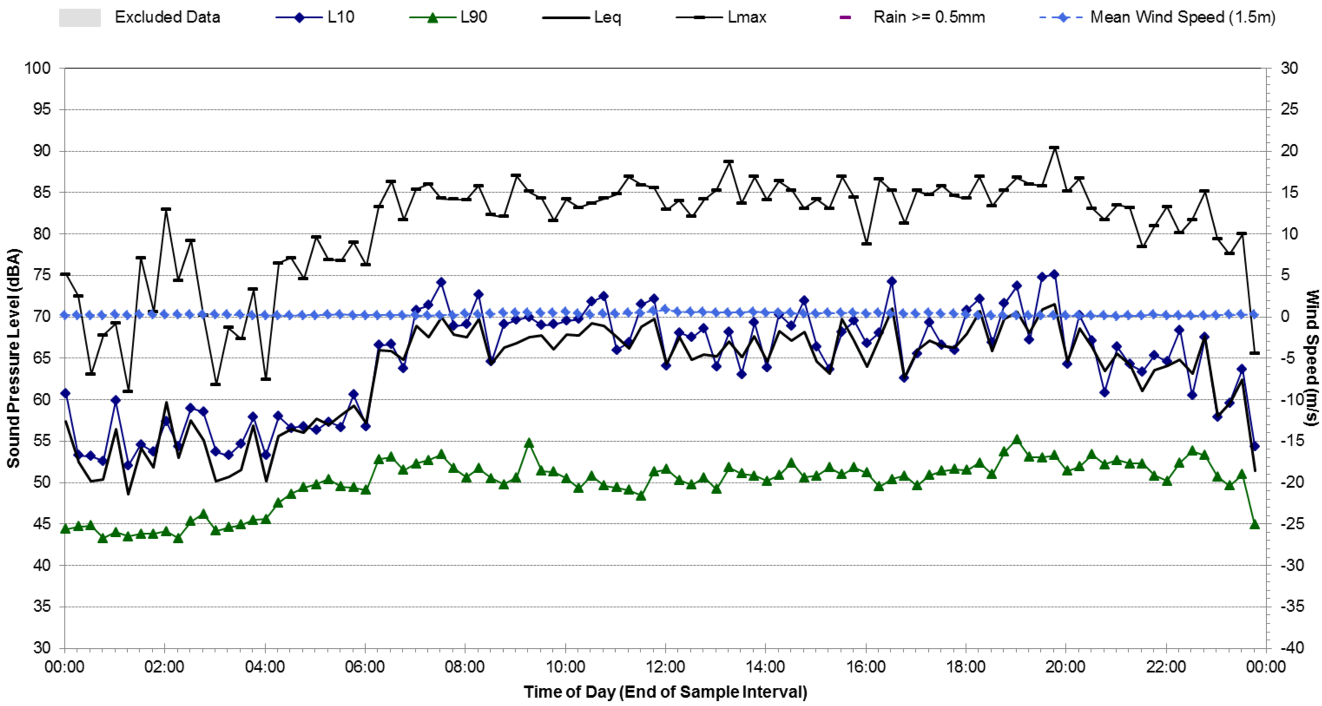
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Tuesday, 6 August 2019



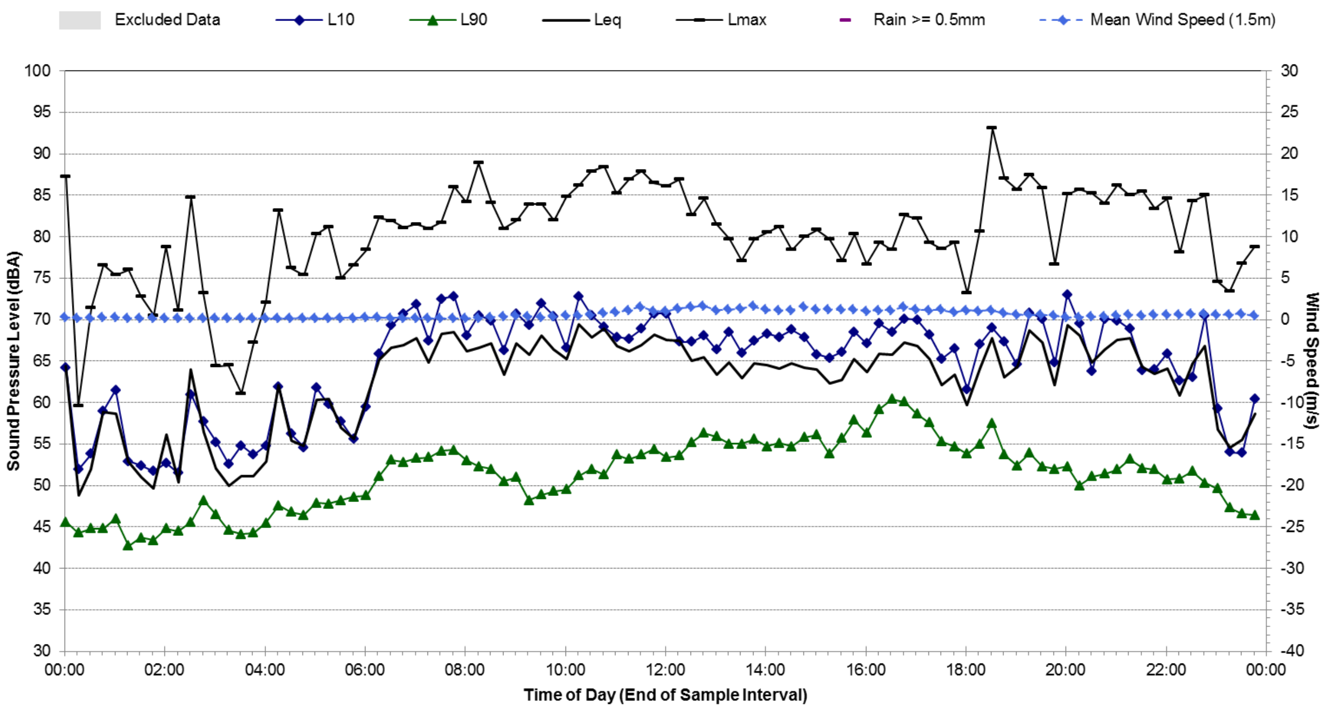
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Wednesday, 7 August 2019



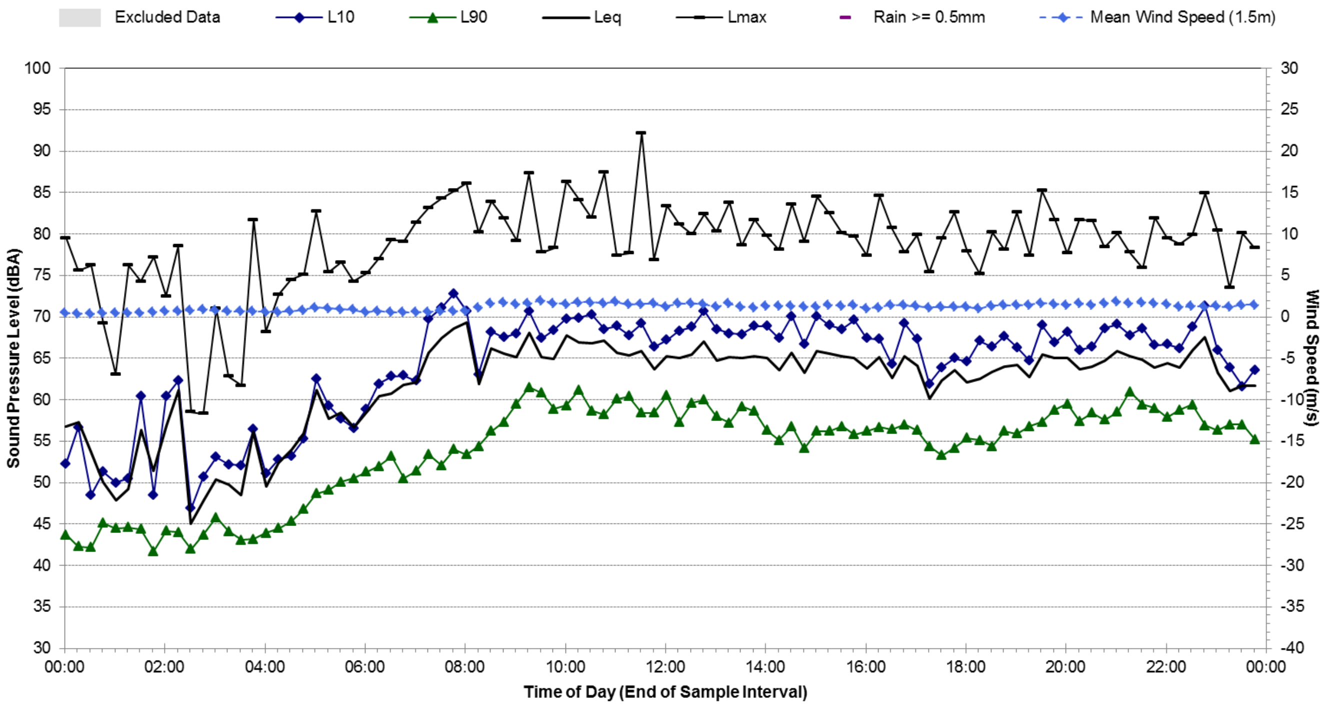
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Thursday, 8 August 2019



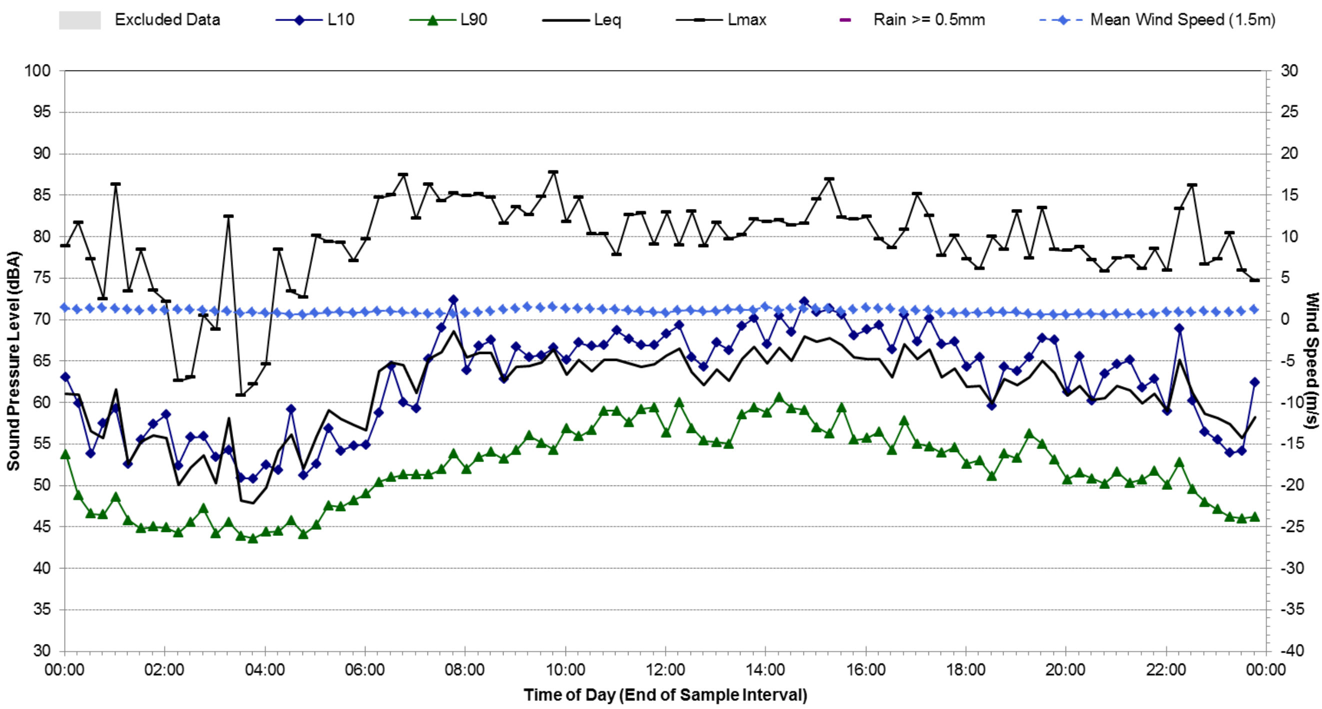
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Friday, 9 August 2019



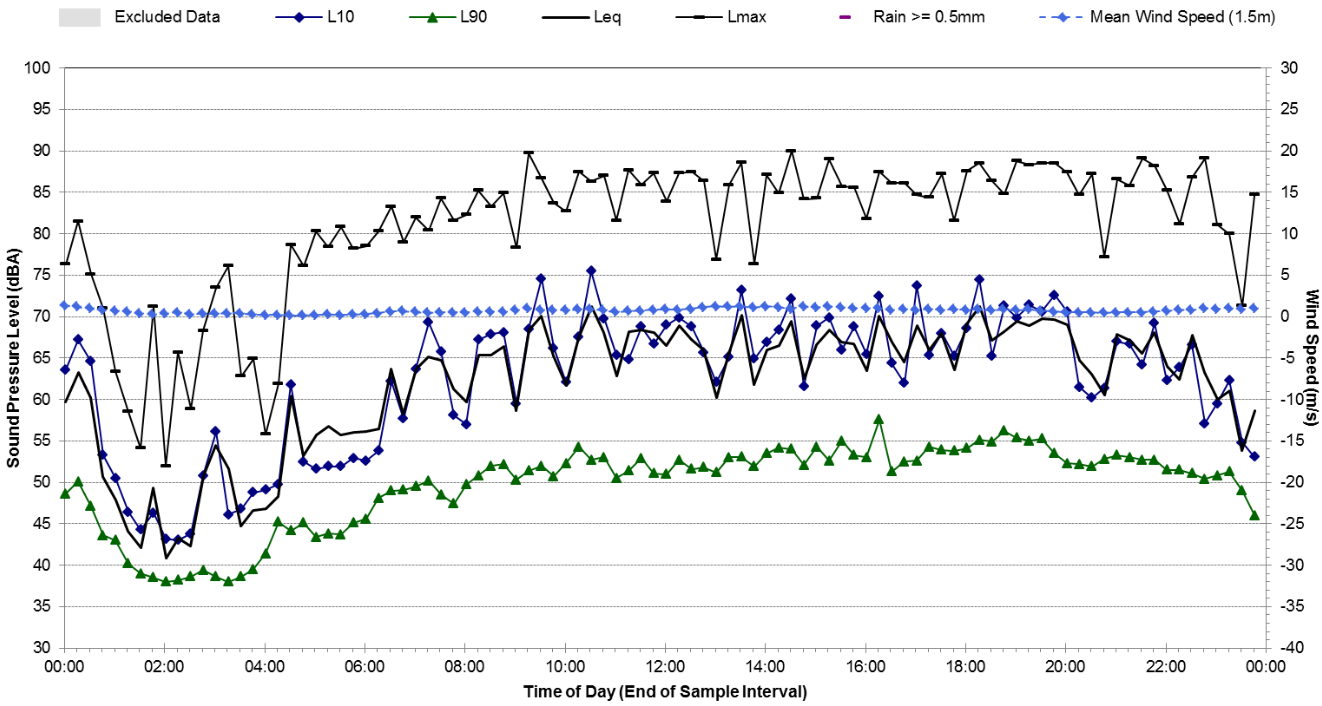
Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Saturday, 10 August 2019



Statistical Ambient Noise Levels

L09 - 105 Baxter Road, Mascot - Sunday, 11 August 2019



APPENDIX C

Standards and Policy

Part 2 Division 2, Offensive noise

2.04 What is offensive noise

(1) For these Regulations, noise that is offensive occurs when noise is generated at a volume, or in a way, or under a circumstance, that, in the opinion of an airport environment officer, offensively intrudes on individual, community or commercial amenity.

(2) In forming an opinion, an airport environment officer must have regard to:

(a) the volume, tonality and impulsive character (if any) of the noise; and

(b) the time of day, and duration, of the noise; and

(c) background noise levels at the time the noise is generated; and

(d) the location, in relation to the source of the noise, of:

(i) sensitive receptors; or

(ii) if there is no affected sensitive receptor — commercial receptors; and

(e) the excessive noise guidelines in Schedule 4.

(3) For subregulation (2):

***commercial receptor** means a business operation, whether for profit, or not.*
***sensitive receptor** means:*

(a) a dwelling; or

(b) an impermanent dwelling in a place designed, or reserved, for impermanent dwellings (for example, a caravan park or residential marina); or

(c) a hotel, motel or hostel; or

(d) a child care institution, kindergarten, school, college, university or other educational institution; or

(e) a hospital, medical centre or nursing home; or

(f) a building that is a church or similar place of worship.

Schedule 4 Excessive noise – guidelines

Part 3 Sensitive receptors

2.02 Noise from construction, etc

(1) Noise generated from construction, maintenance or demolition of a building or other structure at an airport should not exceed 75 dB(A), calculated in accordance with subclause (2), at the site of a sensitive receptor.

(2) For subregulation (1), the sound pressure level of a particular noise is the sound pressure level that is exceeded for 10% of a period of at least 15 minutes, adjusted to take account of tonal character and impulsiveness (if any) of the noise.

2.03 Noise from road traffic

Noise generated from road traffic on the site of an operator of an undertaking at an airport should not exceed:

(a) 60 dB(A), calculated as the equivalent continuous A-weighted sound pressure level for a 24 hour period of measurement; and

(b) 55 dB(A), calculated as the equivalent continuous A-weighted sound pressure level for an 8 hour period of measurement from 22:00 hours on a particular day to 06:00 hours on the following day.

2.05 Noise from ground-based aircraft operations

(1) For ground-based aircraft operations, there are no indicators of noise that is excessive, but the following considerations apply in determining whether noise is excessive.

(2) Noise from ground-based aircraft running for any reason should only be generated in a manner that is consistent with:

(a) within 1 year after the airport at which the ground running is being conducted is first leased — guidelines for ground running published by the Federal Airports Corporation and in effect when these Regulations are made; or

(b) at a time after 1 year after the airport is first leased — express provision in the final master plan for the airport.

(3) In relation to other ground-based operations and in relation to ground-based aircraft running at times other than a time to which subclause (2) applies, matters to be considered are:

(a) the distance between the source of the noise and the site of the sensitive receptor; and

(b) the background noise level;

(c) the time of day when the noise occurs; and

(d) if the noise source is an aircraft engine — the power setting of the engine;

(e) anything included in the final master plan (if any) for the airport at which ground running is being conducted that is relevant to this clause.

(4) In this regulation:

***ground-based aircraft operations** means:*

(a) operation of an auxiliary power unit of an aircraft; or

(b) ground-based aircraft running; or

(c) test-bed running of an aircraft engine removed from an aircraft.

***ground-based aircraft running** means test operation of an engine attached to an aircraft.*

Part 3 Commercial receptors

1.01 Application

This Part applies to sites of commercial receptors, and a reference in a provision of this Part to a sound pressure is a reference to sound pressure measurable at the site of a commercial receptor.

3.02 Noise from any source

For sites of commercial receptors, the indicators of noise that is excessive are the indicators mentioned for sites of sensitive receptors, but the following considerations also apply in determining whether noise is excessive at a particular site:

(a) the nature of the business conducted at the site;

(b) the time of day when the noise occurs;

(c) the duration of the noise;

(d) the nature and characteristics (if any) of the noise;

(e) the background noise level.

APPENDIX D

Construction Information

Table 1 Equipment Lists and Sound Power Levels

Ref	Scenario \ Equipment	Concrete Pump/Agitator	Concrete Saw[1]	Excavator - Breaker[1]	Excavator (14 tonne)	Excavator (22 tonne)	Front End Loader	Generator	Hand Tools	Lighting - Diesel Generator	Mobile Crane - Franna	Mobile Crane (400 t)	Paving Machine	Piling - Bored	Piling - Impact[1]	Piling - Vibratory	Pneumatic hammer[1]	Rock Crusher	Roller - Smooth Drum	Roller - Vibratory (12 t)[1]	Semi Trailer	Truck
	Sound Power Level[2]	106	119	121	97	99	104	102	94	98	98	106	105	111	134	116	114	118	107	109	106	107
1a	Enabling Works (inc. Utilities) - Peak		X	X		X											X		X			X
1b	Enabling Works (inc. Utilities) - Typical					X			X													X
2a	Compounds Establishment - Peak		X	X		X	X		X										X	X		X
2b	Compounds Establishment - Typical					X			X		X											X
2c	Compound Operation					X		X	X		X											X
3a	Site Establishment					X	X		X		X									X		X
4a	Demolition - Peak		X	X			X		X	X		X					X				X	X
4b	Demolition - Typical					X	X		X	X												X
5a	Bridges - Peak				X		X		X	X	X					X				X	X	X
5b	Bridges - Typical								X	X		X										X
6a	Road Works - Peak	X	X				X		X				X	X						X	X	X
6b	Road Works - Typical					X	X		X													
6c	Road Works - Dynamic Compaction											X										
7a	Finishing Works				X				X		X											X
CG1	Crushing and Grinding					X	X											X				X
IP1	Impact Piling														X							

Note 1: Equipment classed as 'annoying' in the ICNG, due to being highly noise intensive, tonal and/or intermittent, and requires an additional 5 dB correction.

Note 2: Sound power level data is taken from the DEFRA Noise Database, RMS *Construction and Vibration Guideline* and TfNSW *Construction Noise and Vibration Strategy*.

Table 2 Predicted Worst-case Construction Noise Levels (dBA) – Residential Receivers

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
Daytime	1a	Enabling Works (inc. utilities)	Peak	51	56	61	54	-	-	66	-	76
	1b		Typical	36	41	46	39	-	-	51	-	61
	2a	Compound Establishment	Peak	44	54	57	62	-	-	64	-	58
	2b		Typical	<30	39	42	47	-	-	49	-	43
	2c	Compound Operation	-	31	41	44	49	-	-	51	-	45
	3a	Site Establishment	-	45	49	53	60	-	-	58	-	68
	4a	Demolition	Peak	44	53	52	<30	-	-	64	-	58
	4b		Typical	31	40	39	<30	-	-	51	-	45
	5a	Bridges	Peak	47	51	57	54	-	-	57	-	58
	5b		Typical	40	44	50	47	-	-	50	-	51
	6a	Road Works	Peak	52	55	58	60	-	-	64	-	60
	6b		Typical	38	41	44	46	-	-	50	-	46
	6c		Dynamic Compaction	<30	39	48	49	-	-	33	-	<30
	7a	Finishing Works		39	42	45	47	-	-	51	-	47
Evening	1a	Enabling Works (inc. utilities)	Peak	51	56	61	54	-	-	66	-	76
	1b		Typical	36	41	46	39	-	-	51	-	61
	2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-
	2b		Typical	-	-	-	-	-	-	-	-	-
	2c	Compound Operation	-	31	41	44	49	-	-	51	-	45
	3a	Site Establishment	-	45	49	53	60	-	-	58	-	68
	4a	Demolition	Peak	-	-	-	-	-	-	-	-	-
	4b		Typical	-	-	-	-	-	-	-	-	-
	5a	Bridges	Peak	47	51	57	54	-	-	57	-	58
	5b		Typical	40	44	50	47	-	-	50	-	51
	6a	Road Works	Peak	52	55	58	60	-	-	64	-	60
	6b		Typical	38	41	44	46	-	-	50	-	46
	6c		Dynamic Compaction	<30	39	48	49	-	-	33	-	<30
	7a	Finishing Works		39	42	45	47	-	-	51	-	47
Night-time	1a	Enabling Works (inc. utilities)	Peak	51	56	61	54	-	-	66	-	76
	1b		Typical	36	41	46	39	-	-	51	-	61
	2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-
	2b		Typical	-	-	-	-	-	-	-	-	-
	2c	Compound Operation	-	31	41	44	49	-	-	51	-	45
	3a	Site Establishment	-	45	49	53	60	-	-	58	-	68
	4a	Demolition	Peak	-	-	-	-	-	-	-	-	-
	4b		Typical	-	-	-	-	-	-	-	-	-
	5a	Bridges	Peak	47	51	57	54	-	-	57	-	58
	5b		Typical	40	44	50	47	-	-	50	-	51
	6a	Road Works	Peak	52	55	58	60	-	-	64	-	60
	6b		Typical	38	41	44	46	-	-	50	-	46
	6c		Dynamic Compaction	<30	39	48	49	-	-	33	-	<30
	7a	Finishing Works		39	42	45	47	-	-	51	-	47

Table 3 Predicted Worst-case NML Exceedances (dB) – Residential Receivers

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
Daytime	1a	Enabling Works (inc. utilities)	Peak	-	-	-	2	-	-	-	-	12
	1b		Typical	-	-	-	-	-	-	-	-	-
	2a	Compound Establishment	Peak	-	-	-	10	-	-	-	-	-
	2b		Typical	-	-	-	-	-	-	-	-	-
	2c	Compound Operation	-	-	-	-	-	-	-	-	-	-
	3a	Site Establishment	-	-	-	-	8	-	-	-	-	4
	4a	Demolition	Peak	-	-	-	-	-	-	-	-	-
	4b		Typical	-	-	-	-	-	-	-	-	-
	5a	Bridges	Peak	-	-	-	2	-	-	-	-	-
	5b		Typical	-	-	-	-	-	-	-	-	-
	6a	Road Works	Peak	-	-	-	8	-	-	-	-	-
	6b		Typical	-	-	-	-	-	-	-	-	-
	6c		Dynamic Compaction	-	-	-	-	-	-	-	-	-
	7a	Finishing Works		-	-	-	-	-	-	-	-	-
Evening	1a	Enabling Works (inc. utilities)	Peak	1	-	-	9	-	-	5	-	20
	1b		Typical	-	-	-	-	-	-	-	-	5
	2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-
	2b		Typical	-	-	-	-	-	-	-	-	-
	2c	Compound Operation	-	-	-	-	4	-	-	-	-	-
	3a	Site Establishment	-	-	-	-	15	-	-	-	-	12
	4a	Demolition	Peak	-	-	-	-	-	-	-	-	-
	4b		Typical	-	-	-	-	-	-	-	-	-
	5a	Bridges	Peak	-	-	-	9	-	-	-	-	2
	5b		Typical	-	-	-	2	-	-	-	-	-
	6a	Road Works	Peak	2	-	-	15	-	-	3	-	4
	6b		Typical	-	-	-	1	-	-	-	-	-
	6c		Dynamic Compaction	-	-	-	4	-	-	-	-	-
	7a	Finishing Works		-	-	-	2	-	-	-	-	-
Night-time	1a	Enabling Works (inc. utilities)	Peak	6	-	8	11	-	-	11	-	26
	1b		Typical	-	-	-	-	-	-	-	-	11
	2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-
	2b		Typical	-	-	-	-	-	-	-	-	-
	2c	Compound Operation	-	-	-	-	6	-	-	-	-	-
	3a	Site Establishment	-	-	-	-	17	-	-	3	-	18
	4a	Demolition	Peak	-	-	-	-	-	-	-	-	-
	4b		Typical	-	-	-	-	-	-	-	-	-
	5a	Bridges	Peak	2	-	4	11	-	-	2	-	8
	5b		Typical	-	-	-	4	-	-	-	-	1
	6a	Road Works	Peak	7	-	5	17	-	-	9	-	10
	6b		Typical	-	-	-	3	-	-	-	-	-
	6c		Dynamic Compaction	-	-	-	6	-	-	-	-	-
	7a	Finishing Works		-	-	-	4	-	-	-	-	-

Table 4 Predicted Worst-case Construction Noise Levels – Commercial Receivers

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
Daytime	1a	Enabling Works (inc. utilities)	Peak	50	64	71	59	79	83	83	84	74
	1b		Typical	35	49	56	44	64	68	68	69	59
	2a	Compound Establishment	Peak	<30	56	65	57	77	62	72	80	59
	2b		Typical	<30	41	50	42	62	47	57	65	44
	2c	Compound Operation	-	<30	43	52	44	64	49	59	67	46
	3a	Site Establishment	-	43	58	68	58	72	75	75	76	66
	4a	Demolition	Peak	<30	56	55	<30	75	61	72	82	57
	4b		Typical	<30	43	42	<30	62	48	59	69	44
	5a	Bridges	Peak	46	58	70	51	75	65	69	78	59
	5b		Typical	39	51	63	44	68	58	62	71	52
	6a	Road Works	Peak	51	64	74	58	90	81	81	80	63
	6b		Typical	37	50	60	44	76	67	67	66	49
	6c		Dynamic Compaction	<30	40	56	47	57	51	36	39	<30
	7a	Finishing Works		38	51	61	45	77	68	68	67	50

Table 5 Predicted Worst-case Construction Noise Levels – 'Other Sensitive' Receivers

Period	ID	Scenario	Activity	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
When in use	1a	Enabling Works (inc. utilities)	Peak	48	57	53	62	-	57	85	85	75
	1b		Typical	33	42	38	47	-	42	70	70	60
	2a	Compound Establishment	Peak	<30	51	53	62	-	53	64	67	61
	2b		Typical	<30	36	38	47	-	38	49	52	46
	2c	Compound Operation	-	<30	38	40	49	-	40	51	54	48
	3a	Site Establishment	-	42	51	50	60	-	49	77	77	67
	4a	Demolition	Peak	<30	51	49	<30	-	<30	67	70	55
	4b		Typical	<30	38	36	<30	-	<30	54	57	42
	5a	Bridges	Peak	44	52	49	56	-	49	72	77	61
	5b		Typical	37	45	42	49	-	42	65	70	54
	6a	Road Works	Peak	49	57	56	60	-	52	83	83	64
	6b		Typical	35	43	42	46	-	38	69	69	50
	6c		Dynamic Compaction	<30	34	45	41	-	38	<30	<30	<30
	7a	Finishing Works		36	44	43	47	-	39	70	70	51

Table 6 Predicted NML Exceedances, All Receiver Types – NCA00

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	41	-	-	-	-	-	-	-	8	-	-	32	-	-	29	-	-
1b		Typical	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	41	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-
5b		Typical	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	41	-	-	-	-	-	-	-	4	-	-	31	-	-	31	-	-
6b		Typical	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 7 Predicted NML Exceedances, All Receiver Types – NCA01

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b		Typical	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	889	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-
6b		Typical	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 8 Predicted NML Exceedances, All Receiver Types – NCA02

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	569	-	1	-	-	1	-	-	-	-	-	16	-	-	4	-	-
1b		Typical	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	569	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
5b		Typical	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	569	-	2	-	-	2	-	-	1	-	-	18	-	-	18	-	-
6b		Typical	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		569	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 9 Predicted NML Exceedances, All Receiver Types – NCA03

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	481	-	15	-	-	249	-	-	324	-	-	370	1	-	324	-	-
1b		Typical	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	481	-	263	-	-	350	29	-	-	-	-	-	-	-	-	-	-
2b		Typical	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		481	-	-	-	-	3	-	-	20	-	-	78	-	-	29	-	-
3a	Site Establishment		481	-	74	-	-	246	7	-	264	21	-	287	59	-	246	7	-
4a	Demolition	Peak	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	481	-	6	-	-	194	-	-	286	-	-	339	1	-	194	-	-
5b		Typical	481	-	-	-	-	-	-	-	6	-	-	53	-	-	1	-	-
6a	Road Works	Peak	481	-	162	-	-	339	17	-	361	48	-	303	117	-	303	117	-
6b		Typical	481	-	-	-	-	-	-	-	3	-	-	17	-	-	3	-	-
6c		Dynamic Compaction	481	-	-	-	-	14	-	-	40	-	-	88	-	-	-	-	-
7a	Finishing Works		481	-	-	-	-	-	-	-	12	-	-	30	-	-	48	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 10 Predicted NML Exceedances, All Receiver Types – NCA04

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	60	-	8	-	-	8	-	-	-	-	-	-	-	-	-	-	-
1b		Typical	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	60	-	5	-	-	5	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		60	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	60	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	60	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	60	-	5	1	-	5	1	-	-	-	-	-	-	-	-	-	-
6b		Typical	60	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		60	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 11 Predicted NML Exceedances, All Receiver Types – NCA05

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	24	-	3	4	-	3	4	-	-	-	-	-	-	-	-	-	-
1b		Typical	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		24	-	5	-	-	5	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	24	-	5	2	-	5	2	-	-	-	-	-	-	-	-	-	-
6b		Typical	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 12 Predicted NML Exceedances, All Receiver Types – NCA06

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	115	-	11	5	1	12	5	1	1	1	1	4	1	1	1	-	-
1b		Typical	115	-	1	-	-	1	-	-	1	-	-	1	-	-	-	-	-
2a	Compound Establishment	Peak	115	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		115	-	6	1	-	6	1	-	1	1	-	1	1	-	-	-	-
4a	Demolition	Peak	115	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	115	-	2	-	-	2	-	-	2	-	-	1	1	-	-	-	-
5b		Typical	115	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
6a	Road Works	Peak	115	-	11	4	-	11	4	-	1	2	-	2	-	1	1	-	-
6b		Typical	115	-	1	-	-	1	-	-	1	-	-	1	-	-	-	-	-
6c		Dynamic Compaction	115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		115	-	1	-	-	1	-	-	1	-	-	1	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 13 Predicted NML Exceedances, All Receiver Types – NCA07

ID	Scenario	Activity	Number of Receivers																	
			Total	HNA[1]	With NML Exceedance[2]															
					Standard Daytime			Out of Hours Works[3]												
								Daytime OOH			Evening			Night-time			Sleep Disturbance			
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	
1a	Enabling Works (inc. utilities)	Peak	62	-	7	6	-	7	6	-	1	2	-	-	1	2	-	-	-	
1b		Typical	62	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	
2a	Compound Establishment	Peak	62	-	4	-	-	4	-	-	-	-	-	-	-	-	-	-	-	
2b		Typical	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2c	Compound		62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3a	Site Establishment		62	-	9	-	-	9	-	-	3	-	-	-	3	-	-	-	-	
4a	Demolition	Peak	62	-	2	1	-	2	1	-	-	-	-	-	-	-	-	-	-	
4b		Typical	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	Bridges	Peak	62	-	3	-	-	3	-	-	1	-	-	2	1	-	-	-	-	
5b		Typical	62	-	1	-	-	1	-	-	-	-	-	2	-	-	-	-	-	
6a	Road Works	Peak	62	-	7	1	-	7	1	-	1	1	-	1	1	1	-	-	-	
6b		Typical	62	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
6c		Dynamic Compaction	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7a	Finishing Works		62	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 14 Predicted NML Exceedances, All Receiver Types – NCA08

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	433	1	14	1	-	27	2	-	44	6	-	188	23	2	116	17	1
1b		Typical	433	-	-	-	-	1	-	-	1	-	-	7	1	-	10	1	-
2a	Compound Establishment	Peak	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		433	-	1	-	-	4	-	-	10	1	-	35	2	-	17	1	-
4a	Demolition	Peak	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	433	-	-	-	-	-	-	-	3	-	-	30	-	-	8	-	-
5b		Typical	433	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
6a	Road Works	Peak	433	-	-	-	-	1	-	-	14	-	-	86	-	-	84	-	-
6b		Typical	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 15 Predicted NML Exceedances, Residential Receivers Only – NCA00

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	34	-	-	-	-	-	-	-	8	-	-	32	-	-	29	-	-
1b		Typical	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	34	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-
5b		Typical	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	34	-	-	-	-	-	-	-	4	-	-	31	-	-	31	-	-
6b		Typical	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 16 Predicted NML Exceedances, Residential Receivers Only – NCA01

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b		Typical	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6b		Typical	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		793	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 17 Predicted NML Exceedances, Residential Receivers Only – NCA02

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	485	-	-	-	-	-	-	-	-	-	-	16	-	-	4	-	-
1b		Typical	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	485	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
5b		Typical	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	485	-	-	-	-	-	-	-	-	-	-	18	-	-	18	-	-
6b		Typical	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		485	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 18 Predicted NML Exceedances, Residential Receivers Only – NCA03

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	430	-	14	-	-	248	-	-	324	-	-	370	1	-	324	-	-
1b		Typical	430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	430	-	261	-	-	348	29	-	-	-	-	-	-	-	-	-	-
2b		Typical	430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		430	-	-	-	-	3	-	-	20	-	-	78	-	-	29	-	-
3a	Site Establishment		430	-	74	-	-	246	7	-	264	21	-	287	59	-	246	7	-
4a	Demolition	Peak	430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	430	-	6	-	-	194	-	-	286	-	-	339	1	-	194	-	-
5b		Typical	430	-	-	-	-	-	-	-	6	-	-	53	-	-	1	-	-
6a	Road Works	Peak	430	-	161	-	-	338	17	-	361	48	-	303	117	-	303	117	-
6b		Typical	430	-	-	-	-	-	-	-	3	-	-	17	-	-	3	-	-
6c		Dynamic Compaction	430	-	-	-	-	14	-	-	40	-	-	88	-	-	-	-	-
7a	Finishing Works		430	-	-	-	-	-	-	-	12	-	-	30	-	-	48	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 19 Predicted NML Exceedances, Residential Receivers Only – NCA04

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 20 Predicted NML Exceedances, Residential Receivers Only – NCA05

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 21 Predicted NML Exceedances, Residential Receivers Only – NCA06

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	22	-	-	-	-	1	-	-	1	-	-	3	1	-	1	-	-
1b		Typical	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		22	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
4a	Demolition	Peak	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	22	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
5b		Typical	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	22	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-	-
6b		Typical	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 22 Predicted NML Exceedances, Residential Receivers Only – NCA07

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a	Compound Establishment	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	Demolition	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	Road Works	Peak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6b		Typical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 23 Predicted NML Exceedances, Residential Receivers Only – NCA08

ID	Scenario	Activity	Number of Receivers																
			Total	HNA[1]	With NML Exceedance[2]														
					Standard Daytime			Out of Hours Works[3]											
								Daytime OOH			Evening			Night-time			Sleep Disturbance		
					1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB	1-10 dB	11-20 dB	>20 dB
1a	Enabling Works (inc. utilities)	Peak	386	1	10	1	-	23	2	-	42	6	-	188	21	2	116	17	1
1b		Typical	386	-	-	-	-	1	-	-	1	-	-	7	1	-	10	1	-
2a	Compound Establishment	Peak	386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b		Typical	386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2c	Compound		386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a	Site Establishment		386	-	1	-	-	4	-	-	10	1	-	33	2	-	17	1	-
4a	Demolition	Peak	386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b		Typical	386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	Bridges	Peak	386	-	-	-	-	-	-	-	3	-	-	28	-	-	8	-	-
5b		Typical	386	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
6a	Road Works	Peak	386	-	-	-	-	1	-	-	14	-	-	84	-	-	84	-	-
6b		Typical	386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6c		Dynamic Compaction	386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7a	Finishing Works		386	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1: Highly Noise Affected, based on ICNG definition (ie predicted noise at residential receiver is 75 dBA or greater).
Note 2: Based on worst-case predicted noise levels.
Note 3: OOH = Out of hours.

Table 24 Predicted Worst-case Construction Noise Levels (dBA) – Qantas Training Facility

Period	ID	Scenario	Activity	Near (works outside facility)	Moderate (works ~100 m away)	Far (works ~300 m away)
When in Use	1a	Enabling Works (inc. utilities)	Peak	85	67	57
	1b		Typical	70	52	42
	3a	Site Establishment		77	59	49
	4a	Demolition	Peak	88[1]	-	-
	4b		Typical	75[1]	-	-
	6a	Road Works	Peak	83	65	55
	6b		Typical	69	51	41
	7a	Finishing Works		70	52	42

Note 1: Demolition works have only been assessed as being at the adjacent building to the east of the Qantas Training Facility.

Table 25 Predicted Worst-case Construction Noise Levels (dBA) – Crushing and Grinding

ID	Receiver Type	Period	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
CR1	Residential	Daytime	<30	52	52	47	-	-	49	-	<30
	Commercial	Daytime	<30	54	58	43	67	47	50	47	<30

Table 26 Predicted Worst-case Construction Noise Levels (dBA) – Impact Piling

ID	Receiver Type	Period	NCA00	NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08
IP1	Residential	Daytime	63	67	66	70	-	-	73	-	74
		Night-time	31	63	72	63	-	-	59	-	31
IP1	Commercial	Daytime	62	74	73	67	84	81	85	94	75
		Night-time	31	65	86	61	91	83	65	68	31
IP1	Other Sensitive	Daytime	60	68	65	84	-	65	88	93	77
		Night-time	31	60	65	69	-	62	61	31	31

Table 27 CNVG Standard Mitigation and Management Measures

Action Required	Applies To	Details
Management measures		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures.	Airborne noise Ground-borne noise & vibration	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Please contact Roads and Maritime Communication and Stakeholder Engagement for guidance. Website (If required) Contact telephone number for community Email distribution list (if required) Community drop in session (if required by approval conditions).
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Airborne noise Ground-borne noise & vibration	Where specified under Appendix C of the CNVG a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage
Source controls		
Construction hours and scheduling	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.

Action Required	Applies To	Details
Construction respite period during normal hours and out-of-hours work	Ground-borne noise & vibration Airborne noise	See Appendix C of the CNVG for more details on the following respite measures: • Respite Offers (RO) • Respite Period 1 (R1) • Respite Period 2 (R2) • Duration Respite (DR)
Equipment selection.	Airborne noise Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Appendix H of the CNVG.
Rental plant and equipment.	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the CNVG.
Use and siting of plant.	Airborne-noise	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise Ground-borne vibration	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters. If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise Ground-borne vibration	Use only the necessary size and power.
Non-tonal and ambient sensitive reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.

Action Required	Applies To	Details
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.
Receptor control		
Structural surveys and vibration monitoring	Ground-borne vibration	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors, vibration monitoring should be conducted during the activities causing vibration.
See Appendix C of the CNVG for additional measures	Airborne noise Ground-borne vibration	In some instances additional mitigation measures may be required.

APPENDIX E

Operational Road Traffic Noise Assessment Information

Table 1 Traffic Volumes – Without Project

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
AIR-EB.001	24348	2296	4553	625	25100	3200	5036	910
AIR-EB.002	22721	1656	4412	424	22938	2548	4194	686
AIR-EB.003	22721	1656	4412	424	22938	2548	4194	686
AIR-EB.004	22861	1381	4445	363	23081	2015	4228	548
AIR-EB.005	22861	1381	4445	363	23081	2015	4228	548
AIR-EB.006	22861	1381	4445	363	23081	2015	4228	548
AIR-EB.007	23415	1351	4648	360	23610	1924	4417	516
AIR-EB.008	23415	1351	4648	360	23610	1924	4417	516
AIR-EB.009	24457	749	4160	202	24526	941	4017	252
AIR-EB.010	16735	643	3088	188	16407	921	2788	206
AIR-EB.011	16735	643	3088	188	16407	921	2788	206
AIR-EB.012	17229	695	3537	191	17074	978	3278	207
AIR-EB.013	17229	695	3537	191	17074	978	3278	207
AIR-WB.001	30504	1394	5777	559	27720	1839	6091	751
AIR-WB.002	30023	1336	4913	592	27182	1815	5165	799
AIR-WB.003	30023	1336	4913	592	27182	1815	5165	799
AIR-WB.004	30023	1336	4913	592	27182	1815	5165	799
AIR-WB.005	19740	1655	3255	732	20116	2357	3637	1032
AIR-WB.006	22432	1077	4535	386	22133	1504	4836	503
AIR-WB.007	21725	1095	4355	363	21460	1646	4664	486
AIR-WB.008	21725	1095	4355	363	21460	1646	4664	486
AIR-WB.009	21725	1095	4355	363	21460	1646	4664	486
AIR-WB.010	21725	1095	4355	363	21460	1646	4664	486
AIR-WB.011	12109	1088	2270	275	13653	2050	2339	390
AIR-WB.012	12109	1088	2270	275	13653	2050	2339	390
AIR-WB.013	22312	1925	4570	457	23662	2868	4680	569
AIR-WB.014	22312	1925	4570	457	23662	2868	4680	569
PRH-SB.007	7465	253	1334	43	7914	258	1490	50
PRH-SB.001	12798	1136	2490	242	13426	1141	2717	269
PRH-SB.002	22189	1684	4330	365	23427	1811	4770	385
PRH-SB.003	22350	2173	6069	408	22776	2320	6093	495
PRH-SB.004	22946	2128	5475	428	23315	2267	5482	522
PRH-SB.005	22946	2128	5475	428	23315	2267	5482	522
PRH-SB.006	29477	3069	6955	575	29915	2952	7062	631
PRH-NB.001	27717	2113	5381	466	27765	2592	5599	493
PRH-NB.002	22714	1639	4327	328	22863	1753	4441	378
PRH-NB.003	22874	1706	4321	336	23137	1828	4446	387
PRH-NB.004	18731	1600	3044	294	20220	1533	3601	310
PRH-NB.005	13713	947	2274	162	14225	916	2623	176
PRH-NB.006	6804	304	1241	60	7282	283	1485	64
CAN-EB.001	8853	1022	1375	222	10049	941	1627	235

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
CAN-EB.002	7975	1477	1269	245	9195	1119	1522	247
CAN-EB.003	7179	1251	1099	191	8440	944	1353	193
CAN-EB.004	7179	1251	1099	191	8440	944	1353	193
CAN-EB.005	7707	1097	1147	205	7916	1110	1252	264
CAN-WB.001	13015	1287	2430	295	13315	1519	2385	405
CAN-WB.002	12051	972	1967	245	13201	1090	2296	236
CAN-WB.003	12051	972	1967	245	13201	1090	2296	236
CAN-WB.004	11742	956	2102	253	12491	1075	2353	245
CAN-WB.005	12805	905	2334	209	13543	986	2588	210
COW-EB.001	11825	1068	1708	208	12147	1097	1878	281
COW-EB.002	5042	520	909	137	4510	626	929	206
COW-EB.003	7052	285	712	90	8284	290	1221	116
COW-WB.001	8276	472	1331	105	9083	447	1422	155
COW-WB.002	4922	597	1198	250	4027	774	1177	290
COW-WB.003	14984	986	2344	330	15336	1221	2593	370
BOU-SB.001	9582	660	1388	197	10036	647	1326	226
BOU-SB.002	8043	294	1072	103	8288	302	1167	126
BOU-SB.003	10137	796	1918	212	10417	946	1891	286
BOU-NB.001	9540	765	1556	365	10026	1049	1708	396
BOU-NB.002	7395	386	1195	152	7697	420	1414	190
BOU-NB.003	12035	789	2054	289	11705	996	1915	410
KNG-EB.001	1796	191	5	1	2767	191	42	8
KNG-WB.001	713	80	0	0	1188	116	77	14
ROB-EB.001	1663	106	57	1	1888	98	144	9
ROB-WB.001	0	0	0	0	0	0	0	0
ORO-SB.001	11025	582	1908	207	11280	770	2070	210
ORO-SB.002	11025	582	1908	207	11280	770	2070	210
ORO-SB.003	19465	1309	3761	436	19610	1637	3850	524
ORO-SB.004	19465	1309	3761	436	19610	1637	3850	524
ORO-SB.005	18113	1148	3756	434	17302	1471	3814	515
ORO-SB.006	18113	1148	3756	434	17302	1471	3814	515
ORO-SB.007	17521	1118	3756	434	16635	1447	3814	515
ORO-SB.008	17521	1118	3756	434	16635	1447	3814	515
ORO-NB.001	30047	1914	6224	764	29591	2560	5713	1054
ORO-NB.002	30047	1914	6224	764	29591	2560	5713	1054
ORO-NB.003	30047	1914	6224	764	29591	2560	5713	1054
ORO-NB.004	28979	1837	6163	764	28381	2488	5558	1044
ORO-NB.005	28979	1837	6163	764	28381	2488	5558	1044
ORO-NB.006	29251	1887	6163	764	29107	2578	5631	1060
ORO-NB.007	29251	1887	6163	764	29107	2578	5631	1060
ORO-NB.008	21179	1192	4658	355	20726	1602	4015	618
ORO-NB.009	21179	1192	4658	355	20726	1602	4015	618
SEV-NB.001	33771	735	7028	261	32559	726	6472	260

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
SEV-NB.002	33771	735	7028	261	32559	726	6472	260
SEV-NB.003	33771	735	7028	261	32559	726	6472	260
SIR-SB.001	35528	907	6486	307	31819	924	6571	328
SIR-SB.002	35950	918	6002	266	32345	940	6099	283
ROS-EB.001	419	42	100	17	651	44	129	18
ROS-EB.002	861	51	92	16	1126	50	146	15
ROS-EB.003	1512	72	301	20	1786	123	372	23
ROS-EB.004	1483	36	494	6	1564	40	514	7
ROS-WB.001	924	28	232	4	1216	82	244	8
ROS-WB.002	1710	50	502	11	1926	54	539	12
ROS-WB.003	495	20	36	6	914	21	51	6
ROS-WB.004	495	20	36	6	914	21	51	6
ROS-WB.005	380	19	74	11	712	21	123	11
BOT-SB.001	14091	3216	2181	784	13278	3356	2414	1029
BOT-SB.002	17376	3439	2511	796	17902	3589	2815	1050
BOT-SB.003	17967	3469	2511	796	18568	3613	2815	1050
BOT-SB.004	17028	2942	2193	698	17426	3148	2450	939
BOT-SB.005	17028	2942	2193	698	17426	3148	2450	939
BOT-NB.001	11528	1608	1925	373	11832	1650	2052	414
BOT-NB.002	11528	1608	1925	373	11832	1650	2052	414
BOT-NB.003	12596	1684	1987	373	13042	1723	2207	424
BOT-NB.004	12049	1821	2005	461	11777	1826	2108	504
KSA-EB.001	35950	918	6002	266	32345	940	6099	283
BUR-EB.001	2572	594	216	91	3082	552	304	95
BUR-WB.001	1457	344	188	51	1598	356	214	57
EUS-NB.001	22970	2343	4836	419	24661	2423	5170	479
EUS-SB.001	22161	2045	4719	296	23349	2144	4979	338
EUS-SB.002	22161	2045	4719	296	23349	2144	4979	338
EUS-SB.003	22161	2045	4719	296	23349	2144	4979	338
CBL-EB.001	22364	2478	4656	487	22992	2416	4699	499
CBL-EB.002	22364	2478	4656	487	22992	2416	4699	499
CBL-EB.003	7207	1039	1360	204	7397	1005	1371	207
CBL-EB.004	8273	1152	1429	222	8516	1071	1450	226
CBL-EB.005	8273	1152	1429	222	8516	1071	1450	226
CBL-EB.006	7640	830	1314	159	8012	745	1324	162
CBL-EB.007	7640	830	1314	159	8012	745	1324	162
CBL-EB.008	5874	266	508	49	6240	245	559	55
CBL-WB.001	10487	770	1615	280	10036	976	1486	402
CBL-WB.002	10487	770	1615	280	10036	976	1486	402
CBL-WB.003	7272	820	1117	194	7241	862	1060	165
CBL-WB.004	7272	820	1117	194	7241	862	1060	165
CBL-WB.005	9094	1382	1496	288	9118	1401	1504	290
CBL-WB.006	9094	1382	1496	288	9118	1401	1504	290

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
CBL-WB.007	9704	1652	1577	320	10089	1626	1661	325
CBL-WB.008	18563	2067	4146	483	19073	2137	4189	513
CBL-WB.009	18563	2067	4146	483	19073	2137	4189	513
GAR-EB.001	17250	3238	3643	871	16564	4079	3442	1186
GAR-EB.002	17250	3238	3643	871	16564	4079	3442	1186
GAR-EB.003	8644	2799	1765	632	8671	3245	1811	841
GAR-WB.001	17540	1899	3582	615	17686	2412	3497	936
GAR-WB.002	20838	2148	4176	764	20178	2837	3995	1140
SPI.001	2632	206	409	40	2928	289	426	38
SPI.002	2632	206	409	40	2928	289	426	38
SPI.003	18231	1918	3741	749	17272	2511	3545	1139
SPI.004	26966	2955	5046	930	26102	3602	4969	1349
SPI.005	18171	2753	3349	393	19175	2868	3535	443
SPI.006	8736	1038	1305	181	8828	1091	1424	210
SPI.007	9435	1714	2044	214	10348	1776	2111	233
SPI.008	5549	932	1146	166	6191	986	1193	176
SPI.009	12695	2040	2727	382	13895	2259	2908	466
SPI.010	2367	723	270	80	2807	823	300	83
SPI.011	2367	723	270	80	2807	823	300	83
SPI.015	17272	3210	3621	899	16585	4041	3421	1224
SPI.012	22051	3596	4932	1035	21481	4490	4835	1431
SPI.013	7145	1108	1581	216	7704	1273	1715	290
SPI.014	14905	2488	3352	819	13778	3217	3121	1141
INT.001	11551	960	1932	289	11028	966	2141	314
INT.002	11551	960	1932	289	11028	966	2141	314
INT.003	9676	326	1862	138	7890	349	2086	149
INT.004	21229	1287	3793	426	18918	1314	4227	464
INT.005	21229	1287	3793	426	18918	1314	4227	464
INT.006	20336	1156	3885	268	19016	1135	3497	267

Table 2 Traffic Volumes – With Project

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
AIR-EB.001	25091	1998	5153	554	26486	2702	5494	749
AIR-EB.002	27951	1725	4799	444	28347	2470	4707	641
AIR-EB.003	27951	1725	4799	444	28347	2470	4707	641
AIR-EB.004	28868	1939	4962	463	29255	2976	4872	609
AIR-EB.005	15454	983	2524	237	16028	1432	2513	277
AIR-EB.006	32912	3584	5998	899	33335	5711	6043	1596
AIR-EB.007	32912	3584	5998	899	33335	5711	6043	1596
AIR-EB.008	12061	3064	2115	658	13015	4951	2022	1202
AIR-EB.014	12061	3064	2115	658	13015	4951	2022	1202
AIR-EB.015	12061	3064	2115	658	13015	4951	2022	1202
AIR-EB.016	12061	3064	2115	658	13015	4951	2022	1202
AIR-EB.009	12695	2379	2458	659	12533	3780	2175	1240
AIR-EB.010	16250	3295	3550	838	17067	4462	3300	1419
AIR-EB.011	16250	3295	3550	838	17067	4462	3300	1419
AIR-EB.012	16416	3386	3979	797	17446	4588	3778	1340
AIR-EB.013	16416	3386	3979	797	17446	4588	3778	1340
TER.001	20852	520	3884	241	20320	760	4021	394
TER.002	20852	520	3884	241	20320	760	4021	394
TER.003	10426	260	1942	121	10160	380	2011	197
TER.004	10426	260	1942	121	10160	380	2011	197
AIR-WB.001	28197	3372	5562	948	26805	4128	5880	1367
AIR-WB.002	28697	3312	4882	1010	27376	4117	5148	1463
AIR-WB.003	28697	3312	4882	1010	27376	4117	5148	1463
AIR-WB.004	28697	3312	4882	1010	27376	4117	5148	1463
AIR-WB.005	22434	3583	3442	1015	23397	4657	3949	1487
AIR-WB.006	16982	3204	2844	809	16829	4288	3208	1291
AIR-WB.010	16982	3204	2844	809	16829	4288	3208	1291
AIR-WB.015	16982	3204	2844	809	16829	4288	3208	1291
AIR-WB.016	36973	3626	7043	1021	37033	4950	7380	1637
AIR-WB.007	36814	3613	7066	996	36886	5000	7396	1588
AIR-WB.008	15169	702	2686	203	15232	1103	2954	239
AIR-WB.009	28598	1928	5289	506	27836	2699	5690	664
AIR-WB.011	27714	1757	5100	480	26959	2413	5508	611
AIR-WB.012	14248	1186	2897	289	16056	1765	2986	395
AIR-WB.013	23894	1904	5610	425	25227	2469	5582	519
AIR-WB.014	23894	1904	5610	425	25227	2469	5582	519
PRH-SB.007	6987	189	1223	34	7511	195	1440	40
PRH-SB.001	11477	967	2117	228	12476	949	2347	248
PRH-SB.002	21659	1602	4070	352	23191	1905	4467	364
PRH-SB.003	20196	1911	5275	374	21174	1994	5536	403
PRH-SB.004	20617	1850	4754	392	21618	1931	4979	423

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
PRH-SB.005	20617	1850	4754	392	21618	1931	4979	423
PRH-SB.006	26734	2781	6209	537	28011	2548	6389	561
PRH-NB.001	25217	1930	4749	437	25785	2254	4944	454
PRH-NB.002	20249	1462	3700	323	21058	1420	3905	324
PRH-NB.003	20508	1544	3696	331	21368	1503	3920	338
PRH-NB.004	17960	1601	2802	291	19658	1534	3226	310
PRH-NB.005	12043	930	1806	150	13075	843	1945	158
PRH-NB.006	6663	306	1016	63	7072	306	1264	67
CAN-EB.001	10119	1102	1527	232	11252	984	1789	248
CAN-EB.002	9107	1518	1438	256	10479	1207	1703	262
CAN-EB.003	8591	1428	1276	206	9837	1051	1543	215
CAN-EB.004	8591	1428	1276	206	9837	1051	1543	215
CAN-EB.005	5148	550	578	79	5709	632	723	86
CAN-WB.001	6550	898	873	105	7895	1007	914	112
CAN-WB.002	12569	1105	1990	247	13940	1407	2177	233
CAN-WB.003	12569	1105	1990	247	13940	1407	2177	233
CAN-WB.004	12664	1053	2148	253	13847	1371	2343	243
CAN-WB.005	13854	1042	2362	208	14804	1235	2559	207
COW-EB.001	8212	973	795	70	8967	721	950	72
COW-EB.002	705	414	0	0	388	249	0	0
COW-EB.003	4432	222	290	45	5428	187	424	36
COW-WB.001	6122	252	548	35	7492	287	644	71
COW-WB.002	2916	454	667	129	2419	642	727	116
COW-WB.003	12168	839	1673	204	12709	1061	1869	188
BOU-SB.001	6658	890	982	181	7271	717	1023	188
BOU-SB.002	6930	423	884	153	7640	362	973	136
BOU-SB.003	7119	900	1121	177	8279	740	1405	167
BOU-NB.001	8664	624	1386	228	8865	804	1579	169
BOU-NB.002	8364	157	1027	66	9256	163	1384	64
BOU-NB.003	10418	335	1147	63	11223	366	1529	63
KNG-EB.001	1364	109	35	0	1862	115	38	0
KNG-WB.001	1018	168	7	50	1483	169	111	33
ROB-EB.001	784	61	0	0	972	67	0	0
ROB-WB.001	300	31	5	0	232	48	12	0
ORO-SB.001	8176	669	1939	133	7775	656	1948	156
ORO-SB.002	8176	669	1939	133	7775	656	1948	156
ORO-SB.003	13814	1512	2976	324	14245	1342	3227	336
ORO-SB.004	13814	1512	2976	324	14245	1342	3227	336
ORO-SB.005	13333	1446	2984	324	13529	1284	3228	336
ORO-SB.006	13333	1446	2984	324	13529	1284	3228	336
ORO-SB.007	13361	1644	2989	324	13417	1684	3242	337
ORO-SB.008	13361	1644	2989	324	13417	1684	3242	337
ORO-NB.001	19301	1440	3792	316	20038	1886	3643	265

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
ORO-NB.004	18788	1212	3792	316	19409	1468	3643	265
ORO-NB.005	18788	1212	3792	316	19409	1468	3643	265
ORO-NB.006	18925	1334	3755	373	19740	1575	3720	303
ORO-NB.007	18925	1334	3755	373	19740	1575	3720	303
ORO-NB.008	11875	752	2417	119	12696	811	2237	116
ORO-NB.009	11875	752	2417	119	12696	811	2237	116
SEV-NB.001	34943	772	7268	350	33702	979	6716	483
SEV-NB.003	14554	363	3468	122	13103	340	2942	114
SEV-NB.002	20389	409	3799	228	20599	639	3775	369
SEV-NB.004	20389	409	3799	228	20599	639	3775	369
SIR-SB.001	16070	457	3336	139	12860	463	3315	134
SIR-SB.002	16070	457	3336	139	12860	463	3315	134
ROS-EB.001	1073	61	237	20	1304	66	271	22
ROS-EB.002	1416	64	207	17	1625	67	272	17
ROS-EB.003	1781	80	274	18	2192	157	360	23
ROS-EB.004	1599	41	514	8	1687	44	536	8
ROS-WB.001	1138	37	224	4	1592	116	241	9
ROS-WB.002	1267	37	374	9	1446	38	413	8
ROS-WB.003	427	17	32	5	767	17	47	5
ROS-WB.004	427	17	32	5	767	17	47	5
ROS-WB.005	411	20	94	13	712	21	135	13
BOT-SB.001	10422	1209	1183	206	10470	1119	1361	223
BOT-SB.002	12699	1329	1435	216	13542	1241	1631	233
BOT-SB.003	12908	1355	1430	216	13974	1251	1618	232
BOT-SB.004	12613	738	1159	122	13789	736	1289	130
BOT-SB.005	12613	738	1159	122	13789	736	1289	130
BOT-NB.001	10210	713	1576	132	11132	728	1824	155
BOT-NB.002	10210	713	1576	132	11132	728	1824	155
BOT-NB.003	10486	716	1576	132	11442	736	1824	155
BOT-NB.004	10351	926	1545	172	10658	946	1669	233
KSA-EB.001	37115	967	6221	344	33464	1217	6325	481
BUR-EB.001	1827	495	205	93	2247	544	212	92
BUR-WB.001	1403	345	202	56	1513	347	217	60
EUS-NB.001	22345	2188	4522	419	23818	2293	4795	441
EUS-SB.001	20909	1913	4479	285	21509	2001	4693	316
EUS-SB.002	20909	1913	4479	285	21509	2001	4693	316
EUS-SB.003	20909	1913	4479	285	21509	2001	4693	316
CBL-EB.001	21277	2369	4514	462	21952	2285	4557	470
CBL-EB.002	21277	2369	4514	462	21952	2285	4557	470
CBL-EB.003	7861	1014	1476	191	7658	984	1494	195
CBL-EB.004	9086	1142	1570	210	9004	1077	1593	215
CBL-EB.005	9086	1142	1570	210	9004	1077	1593	215
CBL-EB.006	7902	822	1414	145	8183	761	1428	149

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
CBL-EB.007	7902	822	1414	145	8183	761	1428	149
CBL-EB.008	5242	352	562	63	5470	354	586	69
CBL-WB.001	6972	301	668	59	7755	328	995	54
CBL-WB.002	6972	301	668	59	7755	328	995	54
CBL-WB.003	8308	1032	1256	198	8757	1095	1484	207
CBL-WB.004	8308	1032	1256	198	8757	1095	1484	207
CBL-WB.005	9298	1338	1555	285	9495	1365	1725	292
CBL-WB.006	9298	1338	1555	285	9495	1365	1725	292
CBL-WB.007	9195	1507	1607	315	9693	1591	1773	321
CBL-WB.008	18083	1935	3980	469	18737	1954	4146	493
CBL-WB.009	18083	1935	3980	469	18737	1954	4146	493
GAR-EB.001	10514	1518	1905	188	11426	1670	1980	230
GAR-EB.002	10514	1518	1905	188	11426	1670	1980	230
GAR-EB.003	9131	1142	1760	156	9856	1294	1913	201
GAR-WB.001	8856	556	1616	75	9894	673	1691	85
GAR-WB.002	8834	586	1466	81	9274	674	1566	89
SPI.001	3359	288	485	41	3784	352	551	44
SPI.002	6997	614	853	106	7757	893	1018	157
SPI.003	5483	294	972	43	5499	319	1006	47
SPI.004	10032	1013	1900	195	9906	1091	1964	222
SPI.005	13462	2354	2934	363	14056	2495	3000	399
SPI.006	4550	717	928	152	4408	771	958	175
SPI.007	8912	1636	2006	211	9649	1724	2043	223
SPI.008	6166	1012	1196	167	6745	1055	1269	177
SPI.009	10377	1719	2305	364	11132	1866	2395	405
SPI.010	2894	697	305	80	3841	810	362	85
SPI.011	2723	678	305	80	3343	777	362	85
SPI.015	10526	1511	1893	195	11438	1663	1968	237
SPI.012	43337	5255	8169	1372	42505	7372	8389	2289
SPI.013	4212	707	1109	197	4387	811	1126	228
SPI.014	7804	833	1588	115	8095	883	1606	152
GWY.001	13414	956	2438	226	13227	1544	2359	332
GWY.002	9	111	0	0	17	188	0	0
GWY.003	3639	325	368	65	3975	542	467	113
GWY.004	3639	325	368	65	3975	542	467	113
GWY.005	31323	3715	5471	1059	30026	5678	5657	1908
GWY.006	17892	2490	2869	755	17420	4082	2921	1484
GWY.007	18063	2508	2869	755	17917	4114	2921	1484
GWY.008	22357	2808	3668	897	22400	3732	3697	1513
GWY.009	3630	215	368	65	3957	353	467	113
GWY.010	18727	2593	3300	832	18443	3379	3230	1400
GWY.011	32130	3439	5738	1058	31654	4735	5589	1732
GWY.012	32130	3439	5738	1058	31654	4735	5589	1732

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
GWY.013	32130	3439	5738	1058	31654	4735	5589	1732
GWY.014	13405	844	2438	226	13211	1356	2359	332
GWY.015	13430	1226	2602	304	12606	1596	2736	424
GWY.016	171	18	0	0	498	32	0	0
GWY.017	171	18	0	0	498	32	0	0
GWY.018	0	0	0	0	0	0	0	0
GWY.019	13430	1226	2602	304	12606	1596	2736	424
GWY.020	171	18	0	0	498	32	0	0
INT.001	8437	702	1630	251	8560	646	1752	267
INT.002	8437	702	1630	251	8560	646	1752	267
INT.003	13435	586	2234	175	10868	667	2554	197
INT.004	21872	1287	3864	426	19430	1314	4306	464
INT.005	21872	1287	3864	426	19430	1314	4306	464
INT.006	20987	1156	3946	268	19598	1135	3552	267

Table 3 Traffic Volumes – Cumulative

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
AIR-EB.001	23658	1844	4829	530	25841	2464	5538	666
AIR-EB.002	26144	1578	4492	418	27715	2365	4793	586
AIR-EB.003	26144	1578	4492	418	27715	2365	4793	586
AIR-EB.004	27062	1816	4658	442	28609	2916	4956	573
AIR-EB.005	15264	935	2547	231	14966	1202	2458	246
AIR-EB.006	32654	3558	5992	907	33008	5568	6116	1605
AIR-EB.007	32654	3558	5992	907	33008	5568	6116	1605
AIR-EB.008	11793	3046	2099	744	11938	4880	1994	1250
AIR-EB.014	11793	3046	2099	744	11938	4880	1994	1250
AIR-EB.015	11793	3046	2099	744	11938	4880	1994	1250
AIR-EB.016	11793	3046	2099	744	11938	4880	1994	1250
AIR-EB.009	12195	2328	2372	651	10716	3587	1997	1231
AIR-EB.010	15041	3169	3041	798	14125	4155	2748	1382
AIR-EB.011	15041	3169	3041	798	14125	4155	2748	1382
AIR-EB.012	15294	3257	3416	760	14516	4275	3158	1303
AIR-EB.013	15294	3257	3416	760	14516	4275	3158	1303
TER.001	20861	513	3893	164	21069	690	4123	355
TER.002	20861	513	3893	164	21069	690	4123	355
TER.003	10431	257	1947	82	10535	345	2062	178
TER.004	10431	257	1947	82	10535	345	2062	178
AIR-WB.001	27040	3177	5265	909	25967	3594	5386	1328
AIR-WB.002	27390	3122	4619	968	26446	3580	4729	1422
AIR-WB.003	27390	3122	4619	968	26446	3580	4729	1422
AIR-WB.004	27390	3122	4619	968	26446	3580	4729	1422
AIR-WB.005	21061	3452	3205	1072	22923	4297	3580	1509
AIR-WB.006	16601	3193	2858	890	17318	4043	3160	1344
AIR-WB.010	16601	3193	2858	890	17318	4043	3160	1344
AIR-WB.015	16601	3193	2858	890	17318	4043	3160	1344
AIR-WB.016	36710	3588	7080	1024	39438	4610	7707	1651
AIR-WB.007	36550	3575	7103	999	39286	4658	7725	1603
AIR-WB.008	14947	654	2718	203	14428	984	2872	226
AIR-WB.009	26365	1728	4835	484	26022	2564	5394	678
AIR-WB.011	25473	1533	4643	451	25161	2232	5212	606
AIR-WB.012	12153	955	2440	262	14052	1509	2659	359
AIR-WB.013	22028	1673	5111	400	23469	2159	5207	483
AIR-WB.014	22028	1673	5111	400	23469	2159	5207	483
PRH-SB.007	7578	211	1292	37	8119	222	1510	47
PRH-SB.001	10020	825	1708	188	10967	779	1861	174
PRH-SB.002	20909	1502	3855	339	22506	1790	4163	345
PRH-SB.003	19350	1647	4805	331	20225	1671	5039	364
PRH-SB.004	19578	1580	4324	343	20427	1600	4527	380

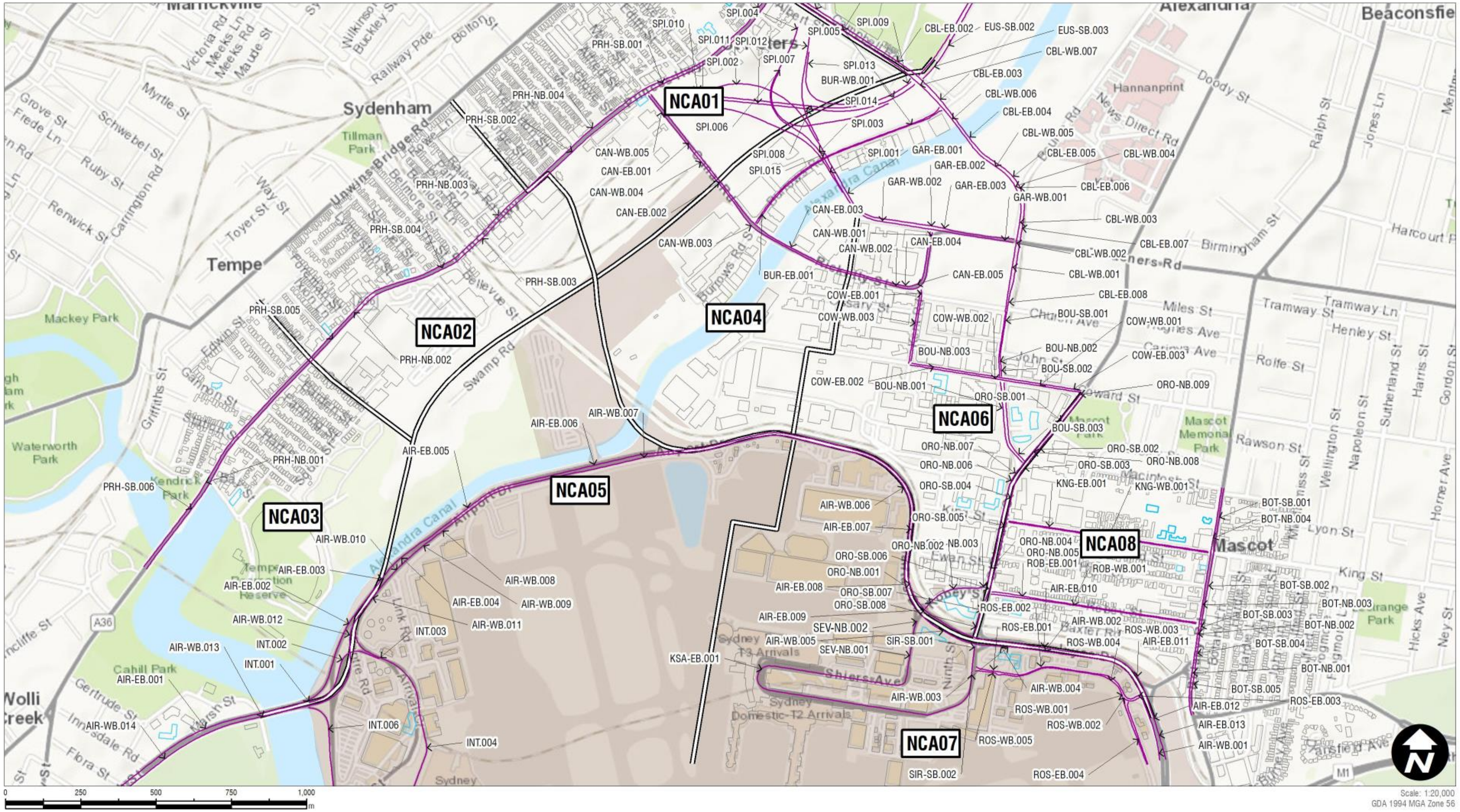
Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
PRH-SB.005	19578	1580	4324	343	20427	1600	4527	380
PRH-SB.006	25709	2483	5797	461	26737	2188	5936	475
PRH-NB.001	23818	1739	4389	387	24126	2037	4501	396
PRH-NB.002	18787	1280	3371	275	19289	1239	3408	294
PRH-NB.003	19176	1390	3397	293	19805	1368	3479	317
PRH-NB.004	17367	1523	2749	280	18991	1501	3027	304
PRH-NB.005	11664	887	1585	124	12418	831	1686	141
PRH-NB.006	6780	314	1103	60	7109	331	1384	65
CAN-EB.001	9786	1032	1532	222	10884	915	1691	199
CAN-EB.002	8917	1512	1467	265	10311	1202	1697	271
CAN-EB.003	8399	1414	1281	216	9601	1039	1513	220
CAN-EB.004	8399	1414	1281	216	9601	1039	1513	220
CAN-EB.005	5836	581	741	92	7242	675	944	97
CAN-WB.001	7619	1022	975	143	9600	1139	1148	186
CAN-WB.002	12803	1199	2017	283	13885	1506	2252	297
CAN-WB.003	12803	1199	2017	283	13885	1506	2252	297
CAN-WB.004	13203	1099	2204	280	14114	1430	2400	302
CAN-WB.005	14257	1023	2397	215	14892	1230	2526	207
COW-EB.001	8344	985	767	75	9285	704	979	80
COW-EB.002	686	413	0	0	157	209	0	0
COW-EB.003	4255	189	230	41	5342	131	502	37
COW-WB.001	6071	230	537	63	7163	229	675	62
COW-WB.002	2933	437	702	133	2178	627	732	115
COW-WB.003	12260	829	1742	214	13113	1072	1986	195
BOU-SB.001	6372	818	903	174	6953	688	964	183
BOU-SB.002	7189	375	978	126	7408	298	912	129
BOU-SB.003	6938	862	1111	150	7817	658	1256	157
BOU-NB.001	8432	608	1433	192	8523	830	1498	171
BOU-NB.002	8827	167	1142	58	8958	177	1267	61
BOU-NB.003	10258	318	1078	50	10945	368	1428	58
KNG-EB.001	1249	79	34	0	1606	90	37	0
KNG-WB.001	1242	203	68	24	1436	178	140	44
ROB-EB.001	645	46	0	0	891	36	0	0
ROB-WB.001	473	32	0	0	629	67	13	0
ORO-SB.001	7388	588	1557	132	6830	585	1709	141
ORO-SB.002	7388	588	1557	132	6830	585	1709	141
ORO-SB.003	12855	1396	2589	293	12821	1187	2829	311
ORO-SB.004	12855	1396	2589	293	12821	1187	2829	311
ORO-SB.005	12435	1339	2593	293	12049	1123	2829	311
ORO-SB.006	12435	1339	2593	293	12049	1123	2829	311
ORO-SB.007	12699	1591	2593	387	12405	1679	2843	362
ORO-SB.008	12699	1591	2593	387	12405	1679	2843	362
ORO-NB.001	18402	1334	3597	383	18116	1850	3167	282

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
ORO-NB.004	17966	1069	3597	289	17497	1325	3167	230
ORO-NB.005	17966	1069	3597	289	17497	1325	3167	230
ORO-NB.006	18375	1245	3630	316	18094	1472	3278	280
ORO-NB.007	18375	1245	3630	316	18094	1472	3278	280
ORO-NB.008	11533	672	2229	104	11510	674	1949	90
ORO-NB.009	11533	672	2229	104	11510	674	1949	90
SEV-NB.001	34929	737	7270	262	33954	843	6754	433
SEV-NB.003	14418	349	3450	119	11402	298	2640	104
SEV-NB.002	20511	388	3820	144	22552	545	4114	328
SEV-NB.004	20511	388	3820	144	22552	545	4114	328
SIR-SB.001	16182	422	3338	136	12520	395	3242	124
SIR-SB.002	16182	422	3338	136	12520	395	3242	124
ROS-EB.001	1005	61	238	20	1329	67	277	23
ROS-EB.002	1342	64	207	17	1616	62	267	15
ROS-EB.003	1689	80	279	18	2071	141	373	21
ROS-EB.004	1588	39	514	8	1685	42	537	8
ROS-WB.001	925	37	229	4	1295	105	264	9
ROS-WB.002	1263	35	373	9	1412	35	409	7
ROS-WB.003	238	17	31	5	549	14	46	4
ROS-WB.004	238	17	31	5	549	14	46	4
ROS-WB.005	230	20	95	13	540	25	145	15
BOT-SB.001	9117	1040	1126	193	8711	900	1196	199
BOT-SB.002	11324	1149	1364	203	11718	1027	1439	209
BOT-SB.003	11391	1162	1364	203	11713	992	1425	209
BOT-SB.004	11136	558	1100	109	11560	509	1104	108
BOT-SB.005	11136	558	1100	109	11560	509	1104	108
BOT-NB.001	9843	611	1477	117	10279	630	1694	136
BOT-NB.002	9843	611	1477	117	10279	630	1694	136
BOT-NB.003	9947	613	1477	117	10548	635	1694	136
BOT-NB.004	9639	761	1380	185	9728	826	1507	210
KSA-EB.001	37124	921	6230	267	33686	1076	6346	436
BUR-EB.001	1533	516	224	94	2012	565	235	97
BUR-WB.001	1416	310	225	50	1523	319	205	58
EUS-NB.001	22974	2228	4796	429	23708	2276	5026	447
EUS-SB.001	22165	2096	4843	309	23128	2168	5237	353
EUS-SB.002	22165	2096	4843	309	23128	2168	5237	353
EUS-SB.003	22165	2096	4843	309	23128	2168	5237	353
CBL-EB.001	22887	2557	4800	495	23871	2625	4943	540
CBL-EB.002	22887	2557	4800	495	23871	2625	4943	540
CBL-EB.003	6923	936	1253	176	6709	898	1282	181
CBL-EB.004	8098	1041	1315	192	7816	974	1351	198
CBL-EB.005	8098	1041	1315	192	7816	974	1351	198
CBL-EB.006	7020	728	1165	127	7062	661	1192	134

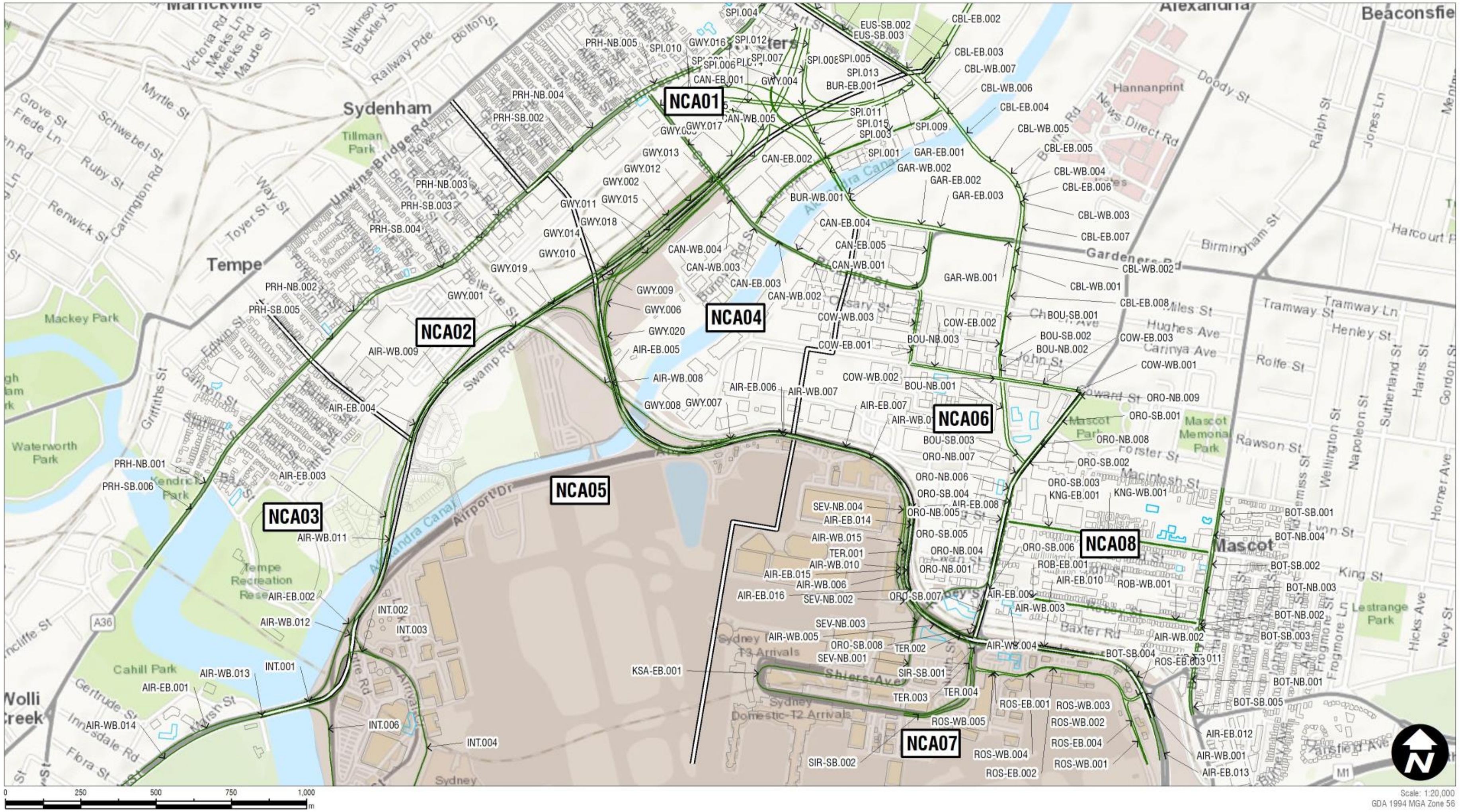
Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
CBL-EB.007	7020	728	1165	127	7062	661	1192	134
CBL-EB.008	5039	313	466	55	5043	318	526	61
CBL-WB.001	7035	284	674	50	7507	337	874	49
CBL-WB.002	7035	284	674	50	7507	337	874	49
CBL-WB.003	8184	1026	1263	191	8382	1136	1470	210
CBL-WB.004	8184	1026	1263	191	8382	1136	1470	210
CBL-WB.005	9345	1312	1563	281	9417	1396	1734	298
CBL-WB.006	9345	1312	1563	281	9417	1396	1734	298
CBL-WB.007	8938	1539	1612	318	9369	1671	1824	335
CBL-WB.008	18214	1932	4065	464	19145	1970	4282	498
CBL-WB.009	18214	1932	4065	464	19145	1970	4282	498
GAR-EB.001	11979	1773	2096	247	13335	1977	2434	337
GAR-EB.002	11979	1773	2096	247	13335	1977	2434	337
GAR-EB.003	9872	1299	1949	191	10571	1483	2218	237
GAR-WB.001	9451	645	1634	88	11263	753	1942	98
GAR-WB.002	9773	675	1547	95	11666	783	1954	109
SPI.001	4252	379	575	55	4839	438	693	62
SPI.002	8176	777	977	128	9285	1145	1214	189
SPI.003	5530	295	962	43	6839	341	1249	49
SPI.004	9772	963	1844	192	10905	1195	2366	275
SPI.005	18594	3013	4142	492	20599	3375	4605	601
SPI.006	4241	669	882	149	4065	854	1116	226
SPI.007	14350	2344	3260	343	16533	2521	3488	375
SPI.008	9124	1288	1931	244	9882	1376	2053	252
SPI.009	12734	1937	2981	418	13825	2080	3158	476
SPI.010	4581	1052	542	143	6340	1299	796	218
SPI.011	4155	920	502	121	5099	1019	709	147
SPI.015	11992	1765	2083	255	13350	1966	2419	348
SPI.012	40432	4965	7549	1337	41206	7151	8292	2331
SPI.013	3610	650	1050	173	3944	704	1106	224
SPI.014	7836	844	1582	134	8250	948	1710	201
GWY.001	11798	881	2111	211	13643	1714	2498	327
GWY.002	28	148	1	4	54	280	1	8
GWY.003	3923	398	402	73	4447	707	521	126
GWY.004	3923	398	402	73	4447	707	521	126
GWY.005	28984	3472	4919	1030	29012	5500	5476	1906
GWY.006	17616	2451	2803	751	17631	4057	2976	1496
GWY.007	17994	2531	2840	771	18658	4200	3041	1525
GWY.008	22321	2817	3670	900	25637	3508	4075	1543
GWY.009	3895	250	400	69	4393	427	519	118
GWY.010	18425	2566	3270	832	21243	3082	3556	1425
GWY.011	30194	3301	5379	1038	34830	4515	6052	1743
GWY.012	30194	3301	5379	1038	34830	4515	6052	1743

Section ID	2026				2036			
	Day Light	Day Heavy	Night Light	Night Heavy	Day Light	Day Heavy	Night Light	Night Heavy
GWY.013	30194	3301	5379	1038	34830	4515	6052	1743
GWY.014	11771	734	2110	206	13588	1434	2497	318
GWY.015	11366	1020	2116	280	11379	1443	2500	410
GWY.016	427	132	40	22	1241	281	87	71
GWY.017	427	132	40	22	1241	281	87	71
GWY.018	51	52	2	2	213	137	22	43
GWY.019	11419	1073	2117	282	11595	1581	2522	452
GWY.020	377	79	38	20	1027	142	66	29
INT.001	8612	695	1633	251	8490	572	1734	235
INT.002	8612	695	1633	251	8490	572	1734	235
INT.003	13291	592	2232	176	11079	741	2585	228
INT.004	21904	1287	3865	426	19568	1314	4320	464
INT.005	21904	1287	3865	426	19568	1314	4320	464
INT.006	21000	1156	3941	268	19749	1135	3569	267

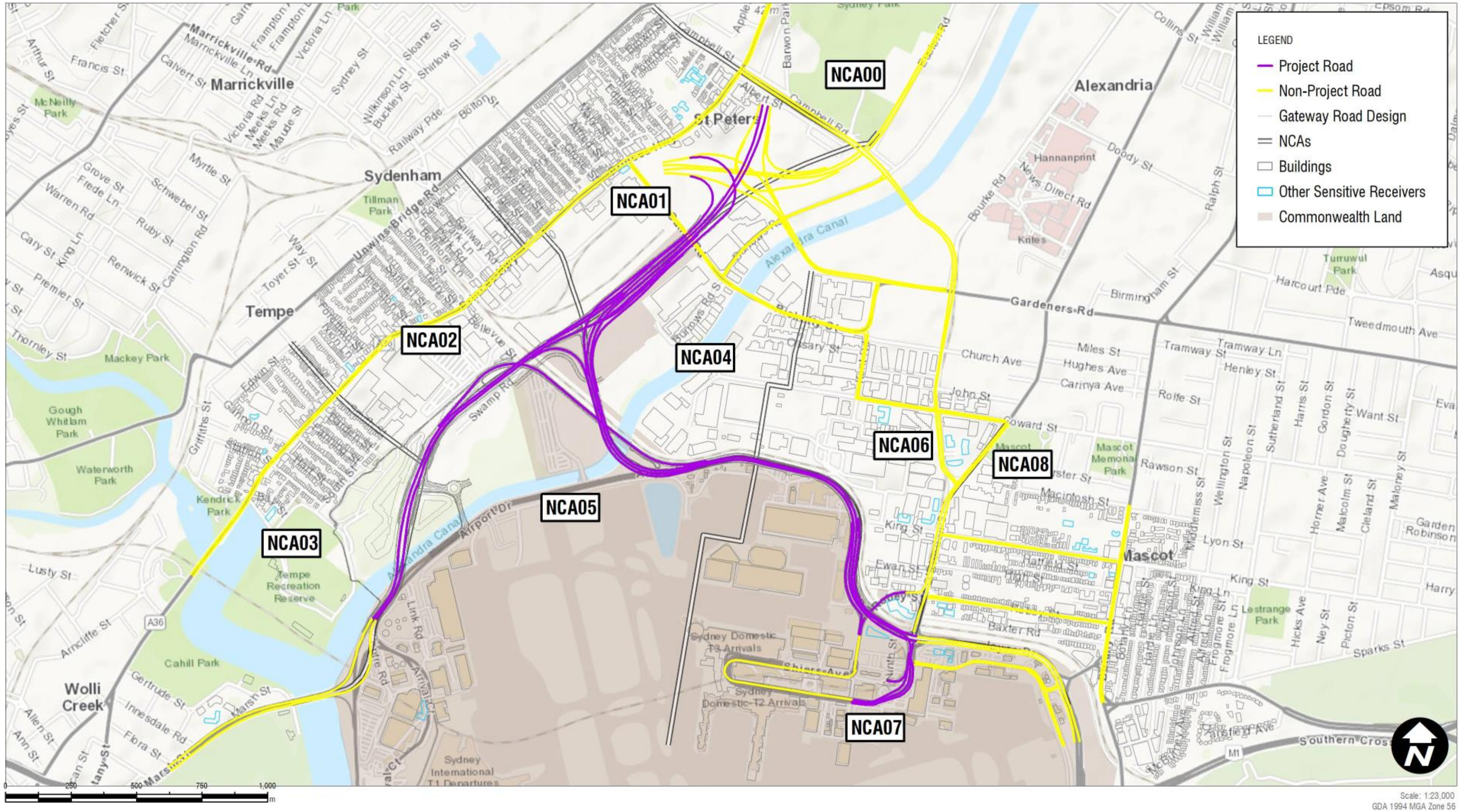
Traffic Volume Section IDs – Without Project



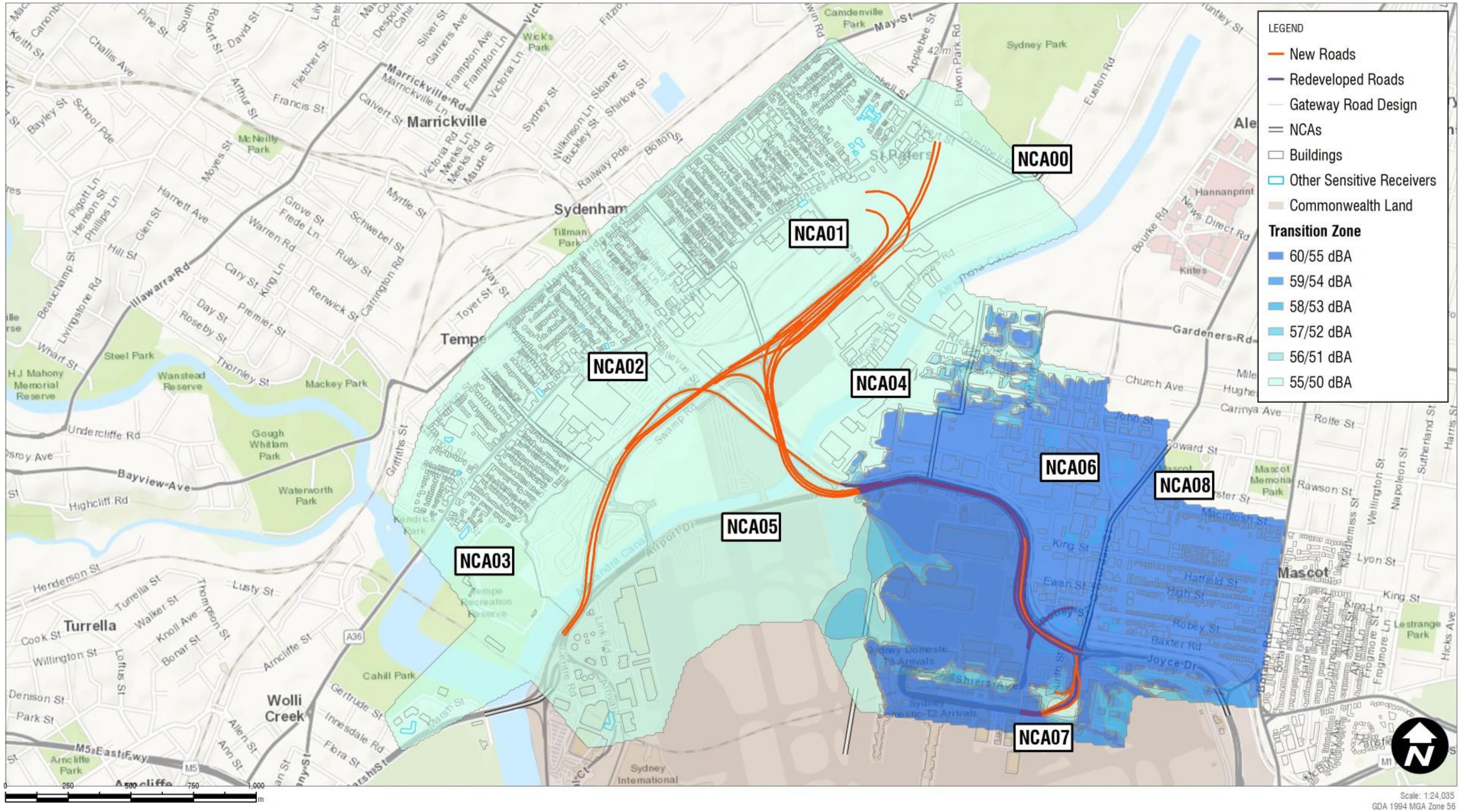
Traffic Volume Section IDs – Without Project



Project and Non-Project Roads

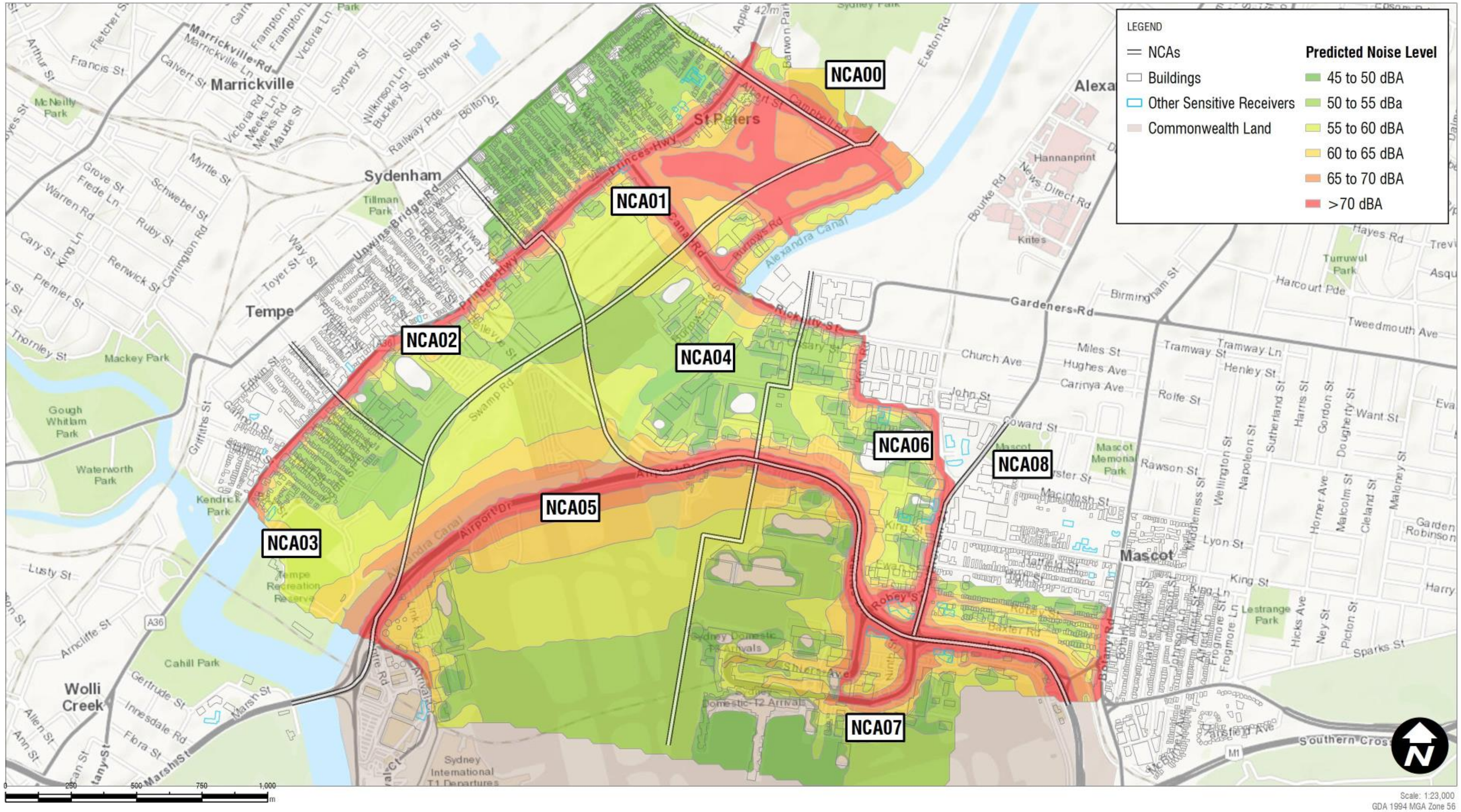


Transition Zones



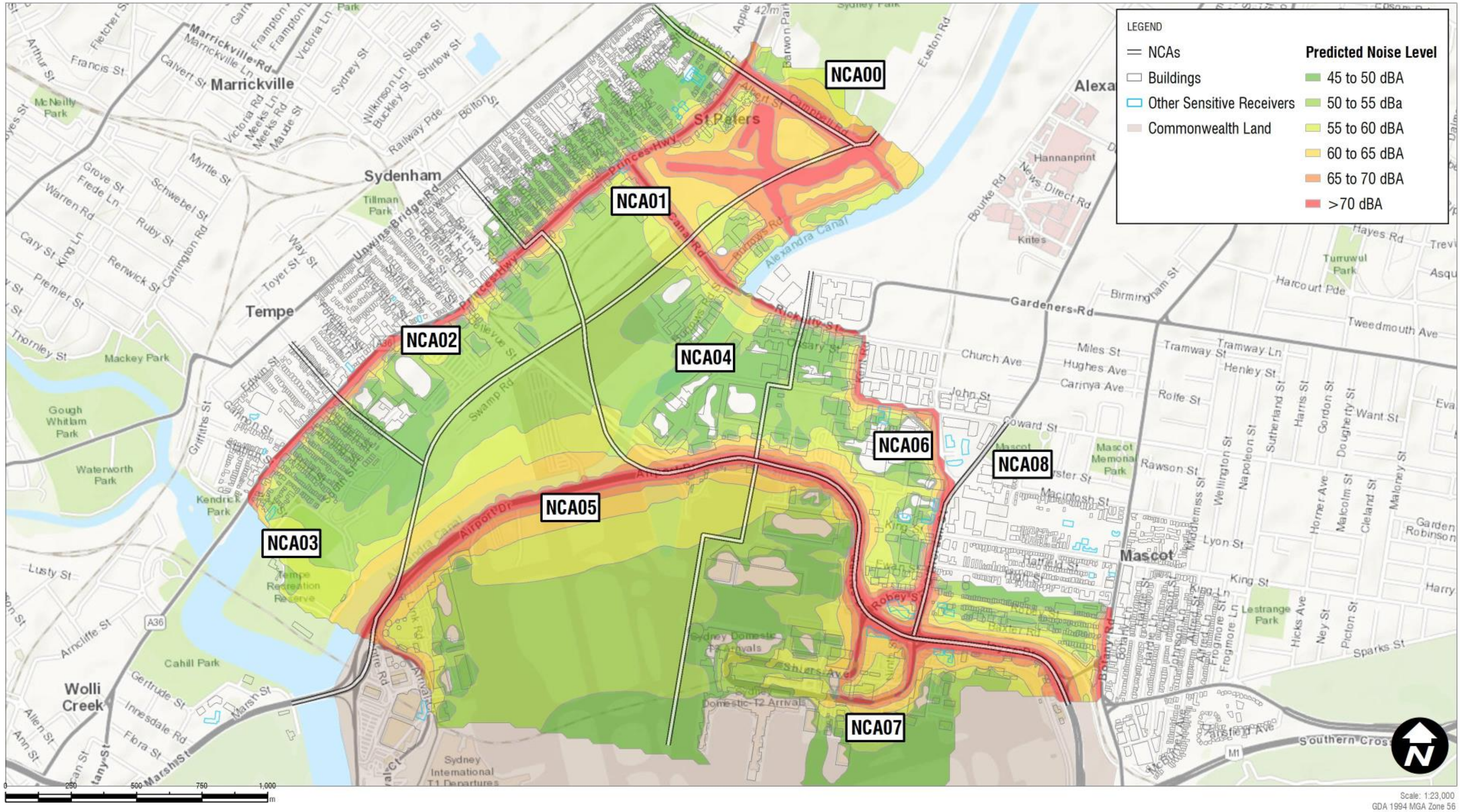
Operational Road Traffic Noise Contours (without Mitigation)

No Build 2036 Daytime



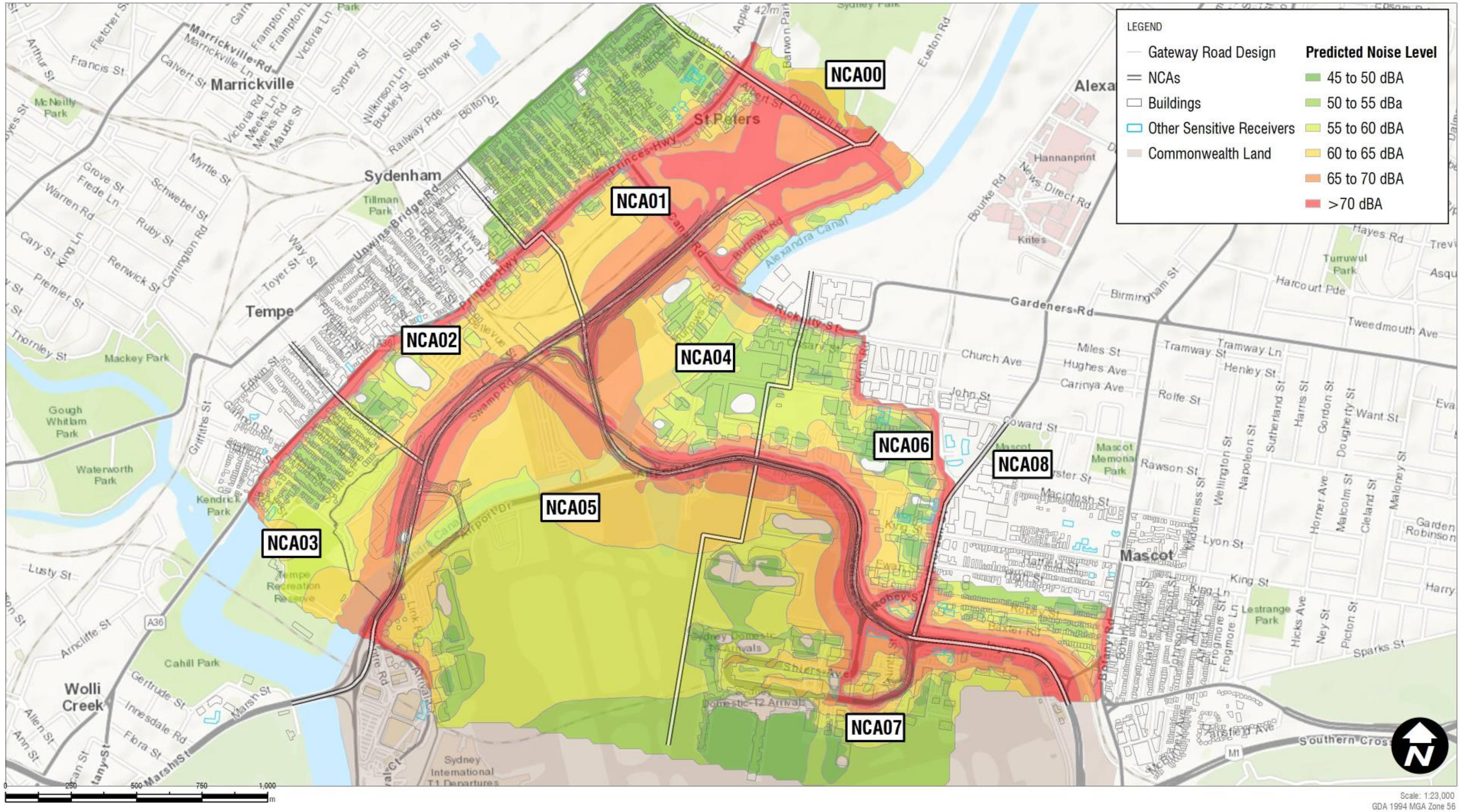
Note: Contours are at 1.5 m height and are facade reflected.

No Build 2036 Night-time



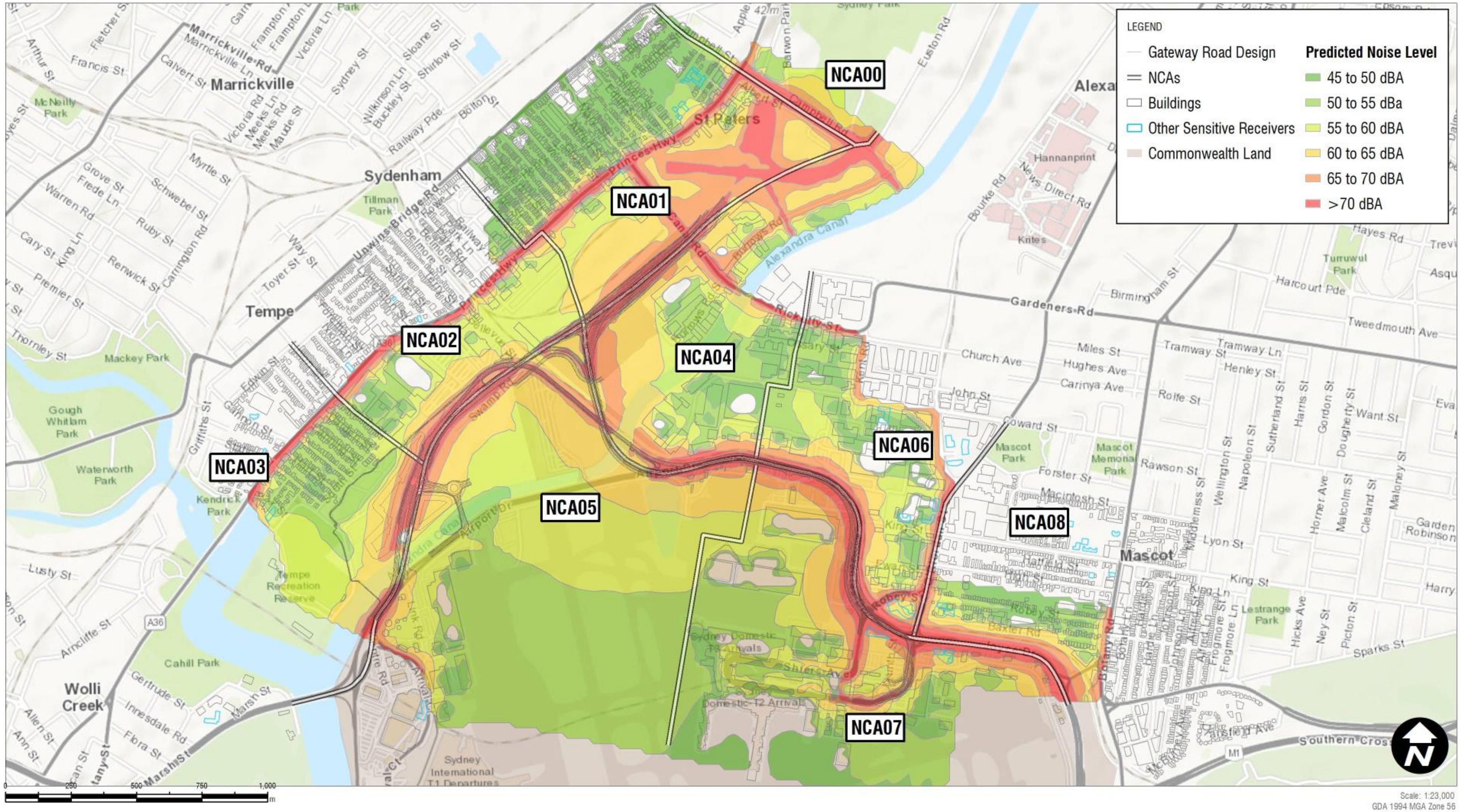
Note: Contours are at 1.5 m height and are facade reflected.

Build 2036 Daytime



Note: Contours are at 1.5 m height and are facade reflected.

Build 2036 Night-time



Note: Contours are at 1.5 m height and are facade reflected.

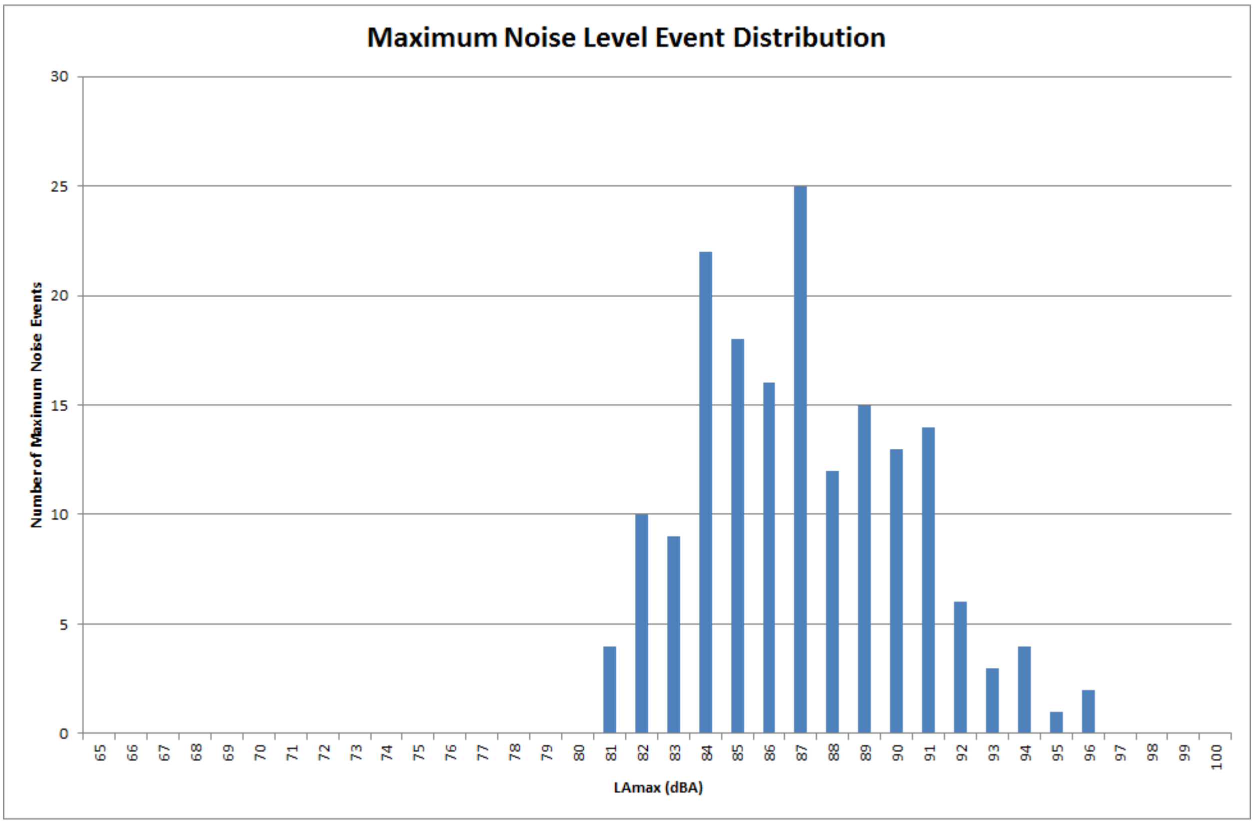
Existing Maximum Noise Levels

L01 – Princes Highway, St Peters

Table 4 L01 Maximum Noise Level Events

Monitoring Date	Number of Maximum Noise Events per Hour (LAmax Noise Levels, dBA)									
	00:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00	05:00-06:00	06:00-07:00	22:00-23:00	23:00-00:00	Total/ (Range)
18-Oct-18	-	-	-	-	-	-	-	6 (90-95)	1 (84)	7 (84-95)
19-Oct-18	4 (82-84)	3 (82-83)	6 (81-82)	8 (82-84)	1 (87)	3 (88-90)	1 (91)	4 (91-94)	-	30 (81-94)
20-Oct-18	-	-	1 (89)	3 (85-87)	1 (90)	-	2 (92-94)	-	-	7 (85-94)
21-Oct-18	-	2 (87-94)	1 (86)	1 (87)	-	-	4 (87-88)	3 (89-91)	-	11 (86-94)
22-Oct-18	-	3 (84-85)	4 (83-84)	3 (84-85)	3 (87-96)	2 (90-92)	-	6 (89-93)	1 (96)	22 (83-96)
23-Oct-18	3 (85)	3 (84-86)	3 (85-89)	2 (83-84)	-	1 (90)	2 (91)	3 (91-93)	3 (87-89)	20 (83-93)
24-Oct-18	2 (86)	1 (92)	-	-	-	-	-	1 (89)	1 (88)	5 (86-92)
25-Oct-18	1 (87)	1 (84)	1 (86)	3 (85-88)	2 (87-88)	1 (90)	-	3 (89-93)	1 (89)	13 (84-93)
26-Oct-18	3 (87)	4 (84-89)	2 (84-86)	3 (85-87)	2 (87-91)	-	-	-	-	14 (84-91)
27-Oct-18	1 (87)	-	3 (85-86)	2 (85-86)	2 (85-86)	-	-	-	-	8 (85-87)
28-Oct-18	1 (87)	-	1 (88)	-	-	-	1 (88)	2 (90-91)	-	5 (87-91)
29-Oct-18	3 (84-86)	3 (84-86)	3 (84-91)	3 (85-90)	1 (88)	-	1 (91)	1 (94)	2 (87)	17 (84-94)
30-Oct-18	3 (86-89)	4 (84-88)	4 (83-85)	1 (87)	2 (87-88)	-	1 (92)	-	-	15 (83-92)

Figure 1 L01 Maximum Noise Level Event Distribution of Monitoring Period

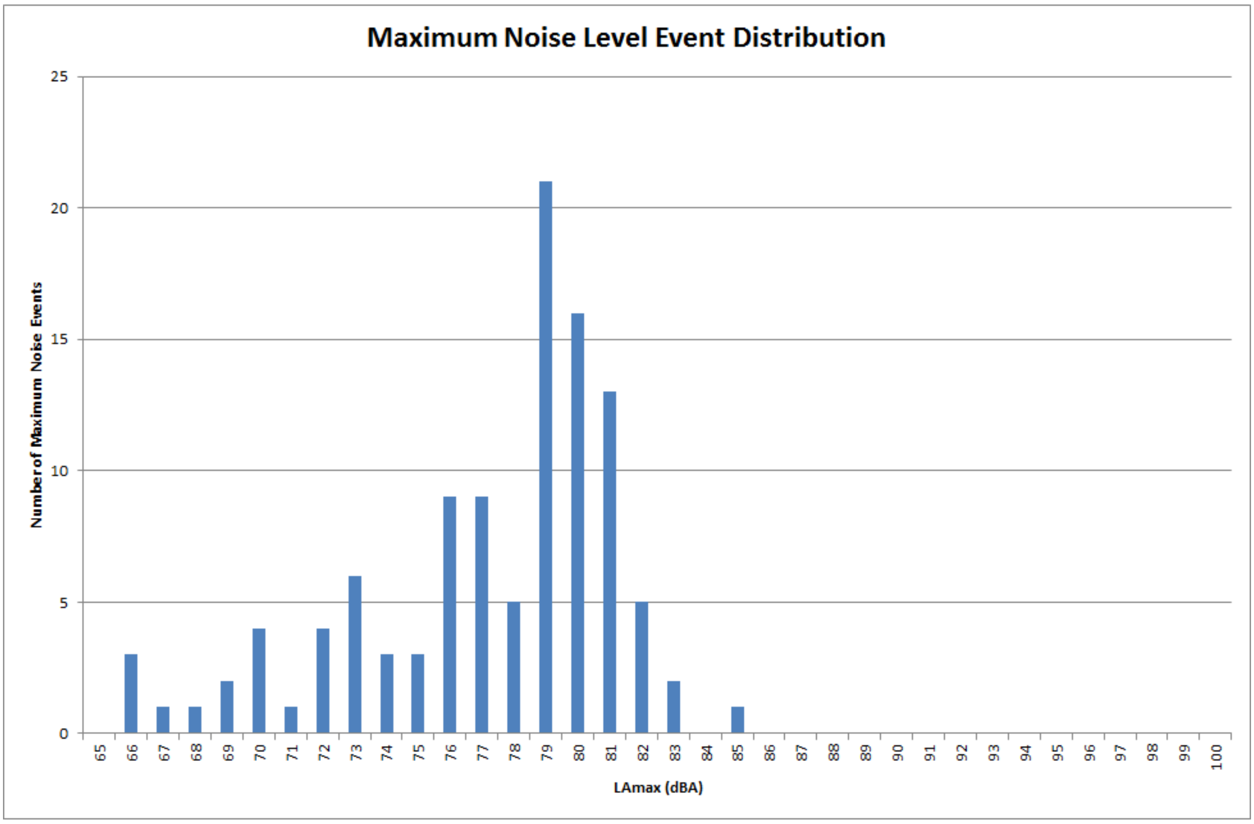


L04 – Alexandra Canal, Tempe

Table 5 L04 Maximum Noise Level Events

Monitoring Date	Number of Maximum Noise Events per Hour (LAmax Noise Levels, dBA)									
	00:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00	05:00-06:00	06:00-07:00	22:00-23:00	23:00-00:00	Total/ (Range)
18-Oct-18	-	-	-	-	-	-	-	6 (80-83)	1 (73)	7 (73-83)
19-Oct-18	-	1 (67)	-	-	-	-	3 (75-76)	11 (78-83)	-	15 (67-83)
20-Oct-18	-	-	3 (68-72)	1 (72)	1 (73)	-	8 (76-79)	3 (80-82)	-	16 (68-82)
21-Oct-18	-	1 (66)	-	-	-	-	2 (78-80)	-	1 (70)	4 (66-80)
22-Oct-18	-	-	-	-	1 (72)	3 (74-76)	1 (77)	10 (80-85)	1 (70)	16 (70-85)
23-Oct-18	-	-	-	-	-	-	4 (77-79)	-	-	4 (77-79)
24-Oct-18	-	-	-	-	-	-	1 (82)	-	-	1 (82)
25-Oct-18	1 (72)	1 (69)	-	-	-	-	-	12 (79-82)	1 (73)	15 (69-82)
26-Oct-18	1 (70)	-	2 (71-80)	-	-	-	-	1 (77)	-	4 (70-80)
27-Oct-18	-	-	-	-	-	-	-	-	-	-
28-Oct-18	-	-	-	-	-	-	-	4 (79-82)	-	4 (79-82)
29-Oct-18	1 (66)	-	-	-	-	2 (76-81)	6 (75-80)	2 (79-80)	4 (73-74)	15 (66-81)
30-Oct-18	-	-	2 (66-70)	-	-	-	6 (79)	-	-	8 (66-79)

Figure 2 L04 Maximum Noise Level Event Distribution of Monitoring Period

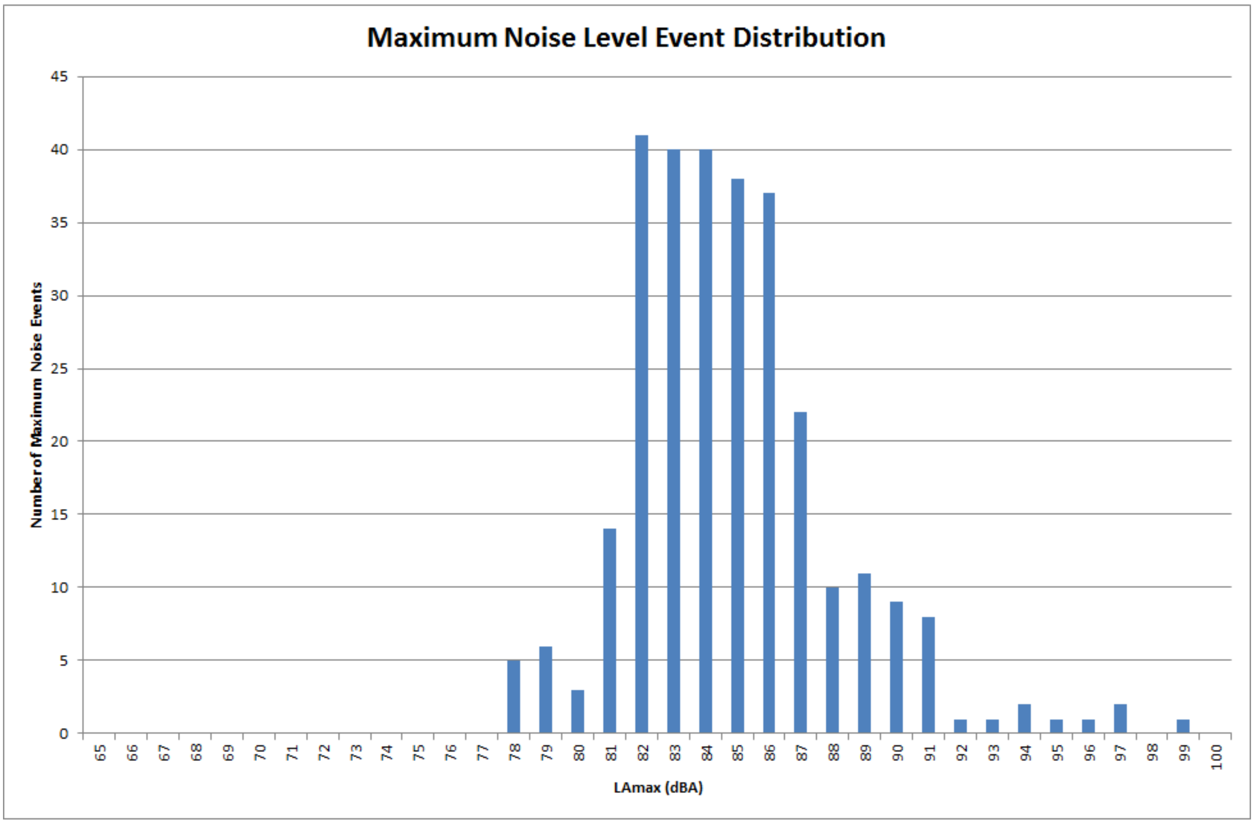


L06 – Qantas Drive, Mascot

Table 6 L06 Maximum Noise Level Events

Monitoring Date	Number of Maximum Noise Events per Hour (LAmax Noise Levels, dBA)									
	00:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00	05:00-06:00	06:00-07:00	22:00-23:00	23:00-00:00	Total/ (Range)
18-Oct-18	-	-	-	-	-	-	-	1 (87)	1 (85)	2 (85-87)
19-Oct-18	4 (83-86)	8 (81-84)	9 (82-86)	3 (83-86)	4 (86-89)	-	1 (91)	1 (87)	-	30 (81-91)
20-Oct-18	5 (81-83)	4 (83-89)	10 (81-86)	5 (83)	2 (84-85)	-	-	-	1 (85)	27 (81-89)
21-Oct-18	4 (82-87)	7 (79-85)	5 (78-82)	3 (80-83)	1 (90)	-	3 (88-91)	-	1 (87)	24 (78-91)
22-Oct-18	5 (82-84)	12 (81-87)	10 (82-85)	3 (84-86)	1 (87)	1 (88)	-	4 (88-94)	2 (89-93)	38 (81-94)
23-Oct-18	7 (85-89)	9 (84-87)	8 (83-91)	1 (87)	1 (91)	-	2 (90-97)	2 (87-92)	1 (89)	31 (83-97)
24-Oct-18	-	-	-	-	-	-	-	-	-	-
25-Oct-18	4 (86-89)	6 (85-91)	5 (83-87)	4 (90-97)	-	1 (91)	-	3 (86-89)	1 (85)	24 (83-97)
26-Oct-18	6 (82-85)	4 (85-90)	2 (84-88)	6 (84-89)	2 (86-87)	-	-	-	3 (85-86)	23 (82-90)
27-Oct-18	2 (83-86)	8 (82-90)	13 (82-87)	1 (86)	2 (84-85)	-	-	-	1 (82)	27 (82-90)
28-Oct-18	2 (81-82)	5 (78-84)	4 (78-82)	6 (83-85)	1 (87)	-	-	-	4 (84-85)	22 (78-87)
29-Oct-18	3 (86-87)	1 (85)	12 (80-86)	6 (81-85)	1 (90)	-	1 (88)	-	1 (86)	25 (80-90)
30-Oct-18	5 (90-103)	5 (82-86)	5 (85-99)	4 (85-88)	1 (87)	1 (88)	-	-	-	21 (82-103)

Figure 3 L06 Maximum Noise Level Event Distribution of Monitoring Period



Receiver Assessment Table

Name	NCA	Flr	Easting	Northing	RecType	Name	Address	NCG Criteria		Period	Predicted Noise Level (dBA)								> 2 dB(A) Increase		Cumulative Limit		Project Acute		Eligible for Consideration of Mitigation
											At Opening (2026)				Future Design (2036)										
											No Build		Build		No Build		Build								
								D	N		D	N	D	N	D	N	D	N	D	N	D	N	D	N	
NCA00.RES.0016.01	NCA00	1	331785	6246028	Residential		29 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	73	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0016.01	NCA00	2	331785	6246028	Residential		29 Campbell Street St Peters 2044	55	50	P	76	73	76	73	77	73	76	73	-	-	-	-	-	Y	Y
NCA00.RES.0020.01	NCA00	1	331789	6246026	Residential		27 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	72	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0020.01	NCA00	2	331789	6246026	Residential		27 Campbell Street St Peters 2044	55	50	P	76	73	76	72	76	73	76	73	-	-	-	-	Y	Y	Y
NCA00.RES.0021.01	NCA00	1	331794	6246022	Residential		25 Campbell Street St Peters 2044	55	50	P	76	72	75	72	76	72	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0021.01	NCA00	2	331794	6246022	Residential		25 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	73	76	73	-	-	-	-	-	Y	Y
NCA00.RES.0026.01	NCA00	1	331798	6246020	Residential		23 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	72	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0026.01	NCA00	2	331798	6246020	Residential		23 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	73	76	73	-	-	-	-	Y	Y	Y
NCA00.RES.0027.01	NCA00	1	331804	6246017	Residential		21 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	72	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0027.01	NCA00	2	331804	6246017	Residential		21 Campbell Street St Peters 2044	55	50	P	76	73	76	73	77	73	77	73	-	-	-	-	Y	Y	Y
NCA00.RES.0029.01	NCA00	1	331807	6246015	Residential		19 Campbell Street St Peters 2044	55	50	P	76	72	76	72	76	72	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0029.01	NCA00	2	331807	6246015	Residential		19 Campbell Street St Peters 2044	55	50	P	76	73	76	73	77	73	77	73	-	-	-	-	Y	Y	Y
NCA00.RES.0033.01	NCA00	1	331836	6246001	Residential		53 Barwon Park Road St Peters 2044	55	50	P	76	72	76	72	76	72	76	72	-	-	-	-	-	Y	Y
NCA00.RES.0033.01	NCA00	2	331836	6246001	Residential		53 Barwon Park Road St Peters 2044	55	50	P	76	73	76	72	76	73	76	73	-	-	-	-	-	Y	Y
NCA00.RES.0033.01	NCA00	3	331836	6246001	Residential		53 Barwon Park Road St Peters 2044	55	50	P	76	72	76	72	76	73	76	73	-	-	-	-	Y	Y	Y
NCA00.RES.0037.01	NCA00	2	331763	6246074	Residential		75 Crown Street St Peters 2044	55	50	P	61	57	62	58	61	57	62	59	-	-	-	Y	-	-	Y
NCA00.RES.0039.01	NCA00	1	331816	6246005	Residential		53 Barwon Park Road St Peters 2044	55	50	P	75	71	75	71	75	71	75	71	-	-	-	-	-	Y	Y
NCA00.RES.0039.01	NCA00	2	331816	6246005	Residential		53 Barwon Park Road St Peters 2044	55	50	P	76	72	76	72	76	72	76	72	-	-	-	-	Y	Y	Y
NCA01.OED.0214.01	NCA01	1	331509	6246025	Other (Educational)	St Peters Public School	Church St, St Peters Nsw 2044	50	-	H	53	51	54	52	53	51	55	53	-	-	Y	-	-	-	Y
NCA01.OED.0214.01	NCA01	2	331509	6246025	Other (Educational)	St Peters Public School	Church St, St Peters Nsw 2044	50	-	H	55	53	56	54	55	53	57	55	-	-	Y	-	-	-	Y
NCA01.OED.0220.01	NCA01	1	331470	6246015	Other (Educational)	St Peters Public School	Church St, St Peters Nsw 2044	50	-	H	54	51	55	52	54	52	55	53	-	-	Y	-	-	-	Y
NCA01.OPW.0320.01	NCA01	1	331462	6245917	Other (Place of Worship)	St Peters Anglican Church	187 Princes Hwy, St Peters Nsw 2044	50	50	H	61	58	61	59	61	59	62	60	-	-	Y	Y	-	-	Y
NCA01.OPW.0320.01	NCA01	2	331462	6245917	Other (Place of Worship)	St Peters Anglican Church	187 Princes Hwy, St Peters Nsw 2044	50	50	H	63	60	63	61	63	61	64	61	-	-	Y	Y	-	-	Y
NCA01.OPW.0320.01	NCA01	3	331462	6245917	Other (Place of Worship)	St Peters Anglican Church	187 Princes Hwy, St Peters Nsw 2044	50	50	H	63	61	64	62	63	61	65	63	-	-	Y	Y	-	-	Y
NCA01.OPW.0334.01	NCA01	1	331431	6245903	Other (Place of Worship)	St Peters Anglican Church	187 Princes Hwy, St Peters Nsw 2044	50	50	H	53	51	55	53	54	52	56	54	Y	Y	Y	-	-	-	Y
NCA01.OPW.0334.01	NCA01	2	331431	6245903	Other (Place of Worship)	St Peters Anglican Church	187 Princes Hwy, St Peters Nsw 2044	50	50	H	57	55	58	56	57	56	59	57	Y	Y	Y	Y	-	-	Y
NCA01.OPW.0366.01	NCA01	1	331446	6245875	Other (Place of Worship)	St Peters Anglican Church	187 Princes Hwy, St Peters Nsw 2044	50	50	H	58	56	59	57	58	57	60	58	-	-	Y	Y	-	-	Y
NCA01.RES.0207.01	NCA01	2	331161	6246032	Residential		59 Edith Street St Peters 2044	55	50	P	50	46	54	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0210.01	NCA01	4	331593	6246029	Residential		124 Church Street St Peters 2044	55	50	P	59	55	60	56	59	55	60	56	-	-	-	Y	-	-	Y
NCA01.RES.0243.01	NCA01	3	331516	6245987	Residential		95 Church Street St Peters 2044	55	50	P	58	54	59	55	58	55	59	56	-	-	-	Y	-	-	Y
NCA01.RES.0247.01	NCA01	3	331512	6245982	Residential		97 Church Street St Peters 2044	55	50	P	59	55	59	55	59	55	60	56	-	-	-	Y	-	-	Y
NCA01.RES.0248.01	NCA01	2	331201	6245981	Residential		Unit 4 45 Edith Street St Peters 2044	55	50	P	51	47	54	50	51	47	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0248.01	NCA01	3	331201	6245981	Residential		Unit 4 45 Edith Street St Peters 2044	55	50	P	52	48	56	52	52	49	56	53	Y	Y	-	-	-	-	Y
NCA01.RES.0257.01	NCA01	2	331213	6245971	Residential		43 Edith Street St Peters 2044	55	50	P	51	47	54	50	51	47	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0291.01	NCA01	2	331238	6245939	Residential		33 Edith Street St Peters 2044	55	50	P	51	47	54	50	51	47	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0300.01	NCA01	2	331248	6245933	Residential		66 Silver Street St Peters 2044	55	50	P	51	47	54	51	51	48	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0324.01	NCA01	1	331262	6245913	Residential		23 Edith Street St Peters 2044	55	50	P	51	47	53	49	51	47	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0325.01	NCA01	2	331369	6245912	Residential		21-23 Silver Street St Peters 2044	55	50	P	51	47	55	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0328.01	NCA01	1	331297	6245905	Residential		34 Silver Street St Peters 2044	55	50	P	50	46	53	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0329.01	NCA01	1	331267	6245905	Residential		21 Edith Street St Peters 2044	55	50	P	51	47	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0331.01	NCA01	2	331375	6245905	Residential		21-23 Silver Street St Peters 2044	55	50	P	52	48	55	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0340.01	NCA01	2	331115	6245896	Residential		67 Mary Street St Peters 2044	55	50	P	53	48	54	50	53	49	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0353.01	NCA01	2	331384	6245886	Residential		Unit 2 13 Silver Street St Peters 2044	55	50	P	55	51	57	53	55	51	58	54	Y	Y	-	-	-	-	Y
NCA01.RES.0358.01	NCA01	1	331325	6245883	Residential		26 Silver Street St Peters 2044	55	50	P	50	46	53	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0373.01	NCA01	1	331333	6245873	Residential		24 Silver Street St Peters 2044	55	50	P	51	47	54	50	51	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0378.01	NCA01	1	331306	6245866	Residential		11 Edith Street St Peters 2044	55	50	P	54	50	56	52	55	51	57	53	Y	Y	-	-	-	-	Y
NCA01.RES.0378.01	NCA01	2	331306	6245866	Residential		11 Edith Street St Peters 2044	55	50	P	56	52	58	54	56	52	59	55	Y	Y	-	Y	-	-	Y
NCA01.RES.0382.01	NCA01	1	331270	6245862	Residential		20 Edith Street St Peters 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0386.01	NCA01	1	331400	6245860	Residential		5 Silver Street St Peters 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0386.01	NCA01	2	331400	6245860	Residential		5 Silver Street St Peters 2044	55	50	P	58	54	59	55	58	54	60	56	Y	Y	Y	Y	-	-	Y
NCA01.RES.0394.01	NCA01	1	331276	6245855	Residential		18 Edith Street St Peters 2044	55	50	P	53	49	55	51	53	49	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0416.01	NCA01	1	331287	6245842	Residential		12 Edith Street St Peters 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0422.01	NCA01	2	331413	6245838	Residential		3 Silver Street St Peters 2044	55	50	P	59	54	60	56	59	55	60	57	Y	Y	-	Y	-	-	Y
NCA01.RES.0425.01	NCA01	1	331329	6245836	Residential		5 Edith Street St Peters 2044	55	50	P	58	53	59	54	58	54	59	55	-	-	-	Y	-	-	Y
NCA01.RES.0427.01	NCA01	1	331294	6245836	Residential		10 Edith Street St Peters 2044	55	50	P	54	50	55	51	54	50	56	52	-	Y	-	-	-	-	Y
NCA01.RES.0432.01	NCA01	2	331371	6245833	Residential		Unit 2 2 Silver Street St Peters 2044	55	50	P	56	52	58	54	56	53	58	55	Y	Y	-	Y	-	-	Y
NCA01.RES.0433.01	NCA01	1	331247	6245831	Residential		17 Roberts Street St Peters 2044	55	50	P	51	46	53	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0439.01	NCA01	1	331300	6245829	Residential		8 Edith Street St Peters 2044	55	50	P	57	53	58	54	57	53	59	55	-	-	-	Y	-	-	Y
NCA01.RES.0440.01	NCA01	2	331207	6245827	Residential		2 Roberts Street St Peters 2044	55	50	P	52	48	54	50	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0445.01	NCA01	1	331253	6245824	Residential		9 Roberts Street St Peters 2044	55	50	P	51	47	54	50	51	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0451.01	NCA01	1	331310	6245822	Residential		1 Roberts Street St Peters 2044	55	50	P	55	51	57	53	55	51	57	54	-	Y	-	-	-	-	Y
NCA01.RES.0476.01	NCA01	1	331263	6245804	Residential		5 Roberts Street St Peters 2044	55	50	P	51	47	54	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0502.01	NCA01	2	331205	6245787	Residential		13 Mary Street St Peters 2044	55	50	P	53	48	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0506.01	NCA01	2	331223	6245786	Residential		11 Mary Street St Peters 2044	55	50	P	53	49	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0530.01	NCA01	2	331178	6245772	Residential		Unit 4 14-18 Mary Street St Peters 2044	55	50	P	52	47	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0530.01	NCA01	3	331178	6245772	Residential		Unit 4 14-18 Mary Street St Peters 2044	55	50	P	58	54	60	56	59	55	61	57	Y	Y	Y	Y	-	-	Y
NCA01.RES.0536.01	NCA01	1	331227	6245769	Residential		5 Mary Street St Peters 2044	55	50	P	52	48	54	50	53	49	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0536.01	NCA01	2	331227	6245769	Residential		5 Mary Street St Peters 2044	55	50	P	55	51	57	53	55	51	58	54	Y	Y	-	-	-	-	Y
NCA01.RES.0538.01	NCA01	2	331030	6245768	Residential		37 Grove Street St Peters 2044	55	50	P	52	47	53	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0548.01	NCA01	2	331141	6245760	Residential		13 Alfred Street St Peters 2044	55	50	P	53	49	55	51	53	50	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0550.01	NCA01	2	331097	6245759	Residential		22 Alfred Street St Peters 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0575.01	NCA01	2	331106	6245744	Residential		20 Alfred Street St Peters 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0583.01	NCA01	2	331110	6245740	Residential		20 Alfred Street St Peters 2044	55	50	P	52	48	54	50	53	49	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0589.01	NCA01	2	331113	6245736	Residential		10 Alfred Street St Peters 2044	55	50	P	53	49	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0780.01	NCA01	1	330916	6245615	Residential		30 Frederick Street Sydenham 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y

Name	NCA	Flr	Easting	Northing	RecType	Name	Address	NCG Criteria D	NCG Criteria N	Period	Predicted Noise Level (dBA) At Opening (2026) No Build D	N	Build D	N	Future Design (2036) No Build D	N	Build D	N	> 2 dB(A) Increase D	N	Cumulative Limit D	N	Project Acute D	N	Eligible for Consideration of Mitigation
NCA01.RES.0781.01	NCA01	1	330967	6245614	Residential		17 Frederick Street St Peters 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0790.01	NCA01	1	330919	6245605	Residential		24 Frederick Street Sydenham 2044	55	50	P	53	49	54	50	53	49	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0791.01	NCA01	1	330972	6245604	Residential		11 Frederick Street St Peters 2044	55	50	P	54	50	56	52	55	51	56	53	-	Y	-	-	-	-	Y
NCA01.RES.0797.01	NCA01	1	330978	6245599	Residential		9 Frederick Street St Peters 2044	55	50	P	55	51	57	53	56	52	57	54	-	Y	-	-	-	-	Y
NCA01.RES.0814.01	NCA01	2	331000	6245582	Residential		1 Frederick Street St Peters 2044	55	50	P	53	49	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0822.01	NCA01	1	330841	6245574	Residential		36 Yelverton Street Sydenham 2044	55	50	P	51	47	53	49	51	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0823.01	NCA01	1	330895	6245573	Residential		23 Yelverton Street Sydenham 2044	55	50	P	51	47	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0825.01	NCA01	1	330844	6245569	Residential		34 Yelverton Street Sydenham 2044	55	50	P	51	47	53	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0828.01	NCA01	1	330902	6245568	Residential		21B Yelverton Street Sydenham 2044	55	50	P	52	48	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0829.01	NCA01	1	330847	6245566	Residential		32 Yelverton Street Sydenham 2044	55	50	P	51	47	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0832.01	NCA01	1	330850	6245563	Residential		30 Yelverton Street Sydenham 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0833.01	NCA01	1	330908	6245561	Residential		21A Yelverton Street Sydenham 2044	55	50	P	54	49	55	51	54	50	56	52	Y	Y	-	-	-	-	Y
NCA01.RES.0835.01	NCA01	1	330853	6245558	Residential		28 Yelverton Street Sydenham 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0839.01	NCA01	1	330916	6245554	Residential		21 Yelverton Street Sydenham 2044	55	50	P	55	50	56	52	55	51	57	53	-	Y	-	-	-	-	Y
NCA01.RES.0840.01	NCA01	1	330858	6245553	Residential		Unit 1 26 Yelverton Street Sydenham 2044	55	50	P	53	49	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0841.01	NCA01	2	330966	6245550	Residential		6 Frederick Street Sydenham 2044	55	50	P	54	50	55	51	54	50	56	52	-	Y	-	-	-	-	Y
NCA01.RES.0842.01	NCA01	1	330922	6245548	Residential		19 Yelverton Street Sydenham 2044	55	50	P	53	49	55	51	53	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0845.01	NCA01	1	330866	6245543	Residential		20 Yelverton Street Sydenham 2044	55	50	P	54	50	56	52	54	50	56	53	Y	Y	-	-	-	-	Y
NCA01.RES.0848.01	NCA01	1	330873	6245536	Residential		18 Yelverton Street Sydenham 2044	55	50	P	54	50	56	52	55	51	57	53	Y	Y	-	-	-	-	Y
NCA01.RES.0851.01	NCA01	1	330877	6245532	Residential		16 Yelverton Street Sydenham 2044	55	50	P	55	51	57	53	55	52	57	54	-	Y	-	-	-	-	Y
NCA01.RES.0855.01	NCA01	1	330884	6245526	Residential		14 Yelverton Street Sydenham 2044	55	50	P	56	52	57	53	56	52	58	54	-	Y	-	-	-	-	Y
NCA01.RES.0858.01	NCA01	1	330887	6245522	Residential		12 Yelverton Street Sydenham 2044	55	50	P	57	52	58	54	57	53	59	55	-	-	-	Y	-	-	Y
NCA01.RES.0861.01	NCA01	1	330893	6245516	Residential		10 Yelverton Street Sydenham 2044	55	50	P	58	53	59	55	58	54	59	56	-	-	-	Y	-	-	Y
NCA01.RES.0864.01	NCA01	1	330896	6245512	Residential		8 Yelverton Street Sydenham 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA01.RES.0869.01	NCA01	1	330857	6245503	Residential		13 George Street Sydenham 2044	55	50	P	51	47	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA01.RES.0871.01	NCA01	1	330860	6245496	Residential		11 George Street Sydenham 2044	55	50	P	52	48	54	51	52	49	55	52	-	Y	-	-	-	-	Y
NCA01.RES.0875.01	NCA01	1	330869	6245486	Residential		7 George Street Sydenham 2044	55	50	P	53	49	55	51	53	49	56	52	Y	Y	-	-	-	-	Y
NCA01.RES.0877.01	NCA01	1	330873	6245480	Residential		5 George Street Sydenham 2044	55	50	P	53	49	55	51	53	50	56	52	Y	Y	-	-	-	-	Y
NCA01.RES.0879.01	NCA01	1	330877	6245475	Residential		3 George Street Sydenham 2044	55	50	P	54	50	56	52	54	50	56	53	Y	Y	-	-	-	-	Y
NCA02.RES.0037.01	NCA01	2	330789	6245515	Residential		52 George Street Sydenham 2044	55	50	P	53	49	56	52	53	50	56	53	Y	Y	-	-	-	-	Y
NCA02.RES.0044.01	NCA01	1	330798	6245503	Residential		46 George Street Sydenham 2044	55	50	P	52	48	54	50	52	49	55	51	-	Y	-	-	-	-	Y
NCA02.RES.0051.01	NCA01	1	330797	6245489	Residential		44 George Street Sydenham 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA02.RES.0052.01	NCA01	1	330812	6245488	Residential		42 George Street Sydenham 2044	55	50	P	53	49	55	51	54	50	56	52	Y	Y	-	-	-	-	Y
NCA02.RES.0063.01	NCA01	1	330820	6245472	Residential		36 George Street Sydenham 2044	55	50	P	52	48	54	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA02.RES.0073.01	NCA01	1	330832	6245459	Residential		28 George Street Sydenham 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA02.RES.0445.01	NCA02	1	330673	6245113	Residential		1-2 Bellevue Street Tempe 2044	55	50	P	52	48	56	53	52	49	57	54	Y	Y	-	-	-	-	Y
NCA02.RES.0456.01	NCA02	1	330687	6245099	Residential		3 Bellevue Street Tempe 2044	55	50	P	61	57	63	59	61	58	63	60	Y	Y	Y	Y	-	-	Y
NCA03.OCC.0471.01	NCA03	1	329887	6244358	Other (Childcare)	Guardian Early Learning Centre	18 Holbeach Avenue Tempe 2044	45	-	H	55	53	57	55	56	54	58	56	Y	-	Y	-	-	-	Y
NCA03.RES.0110.01	NCA03	1	330196	6244732	Residential		Unit 2 34-36 Smith Street Tempe 2044	55	50	P	53	50	56	52	54	50	56	53	Y	Y	-	-	-	-	Y
NCA03.RES.0110.01	NCA03	2	330196	6244732	Residential		Unit 2 34-36 Smith Street Tempe 2044	55	50	P	56	52	58	54	56	52	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0114.01	NCA03	1	330207	6244725	Residential		32 Smith Street Tempe 2044	55	50	P	50	46	55	51	50	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0116.01	NCA03	1	330217	6244723	Residential		30 Smith Street Tempe 2044	55	50	P	51	47	55	51	51	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0120.01	NCA03	1	330225	6244717	Residential		28 Smith Street Tempe 2044	55	50	P	54	50	56	52	54	50	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0125.01	NCA03	1	330232	6244710	Residential		26 Smith Street Tempe 2044	55	50	P	53	49	55	51	53	49	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0126.01	NCA03	1	330240	6244706	Residential		24 Smith Street Tempe 2044	55	50	P	52	48	55	51	53	49	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0127.01	NCA03	1	330112	6244705	Residential		58 Barden Street Tempe 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0131.01	NCA03	2	330173	6244701	Residential		45 Barden Street Tempe 2044	55	50	P	57	53	58	54	57	53	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0133.01	NCA03	1	330245	6244697	Residential		22 Smith Street Tempe 2044	55	50	P	52	48	55	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0136.01	NCA03	2	330179	6244694	Residential		43 Barden Street Tempe 2044	55	50	P	56	52	58	54	56	52	58	54	-	Y	-	-	-	-	Y
NCA03.RES.0137.01	NCA03	1	330189	6244691	Residential		41 Barden Street Tempe 2044	55	50	P	53	49	56	52	54	50	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0140.01	NCA03	1	330252	6244690	Residential		20 Smith Street Tempe 2044	55	50	P	51	47	56	52	51	47	56	53	Y	Y	-	-	-	-	Y
NCA03.RES.0143.01	NCA03	1	330261	6244685	Residential		18 Smith Street Tempe 2044	55	50	P	51	47	56	52	51	47	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0148.01	NCA03	1	330197	6244678	Residential		37 Barden Street Tempe 2044	55	50	P	52	48	55	51	53	49	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0148.01	NCA03	2	330197	6244678	Residential		37 Barden Street Tempe 2044	55	50	P	54	50	58	54	55	51	58	54	Y	Y	-	-	-	-	Y
NCA03.RES.0151.01	NCA03	1	330266	6244676	Residential		16 Smith Street Tempe 2044	55	50	P	50	47	57	53	51	47	57	54	Y	Y	-	-	-	-	Y
NCA03.RES.0153.01	NCA03	1	330212	6244675	Residential		25 Barden Street Tempe 2044	55	50	P	51	47	56	52	51	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0155.01	NCA03	1	330103	6244674	Residential		55 Fanning Street Tempe 2044	55	50	P	53	49	55	51	53	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0157.01	NCA03	1	330273	6244670	Residential		14 Smith Street Tempe 2044	55	50	P	50	46	58	54	51	47	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0158.01	NCA03	1	330107	6244669	Residential		53 Fanning Street Tempe 2044	55	50	P	52	48	54	50	52	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0159.01	NCA03	1	330220	6244668	Residential		23 Barden Street Tempe 2044	55	50	P	50	47	56	52	51	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0161.01	NCA03	1	330283	6244667	Residential		12 Smith Street Tempe 2044	55	50	P	49	45	58	54	50	46	58	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0166.01	NCA03	1	330112	6244663	Residential		51 Fanning Street Tempe 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0166.01	NCA03	2	330112	6244663	Residential		51 Fanning Street Tempe 2044	55	50	P	53	50	56	52	54	50	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0167.01	NCA03	1	330227	6244663	Residential		21 Barden Street Tempe 2044	55	50	P	50	46	56	52	50	47	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0167.01	NCA03	2	330227	6244663	Residential		21 Barden Street Tempe 2044	55	50	P	53	49	59	55	53	49	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0168.01	NCA03	1	330171	6244662	Residential		36 Barden Street Tempe 2044	55	50	P	52	48	55	51	52	48	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0169.01	NCA03	1	330290	6244661	Residential		10 Smith Street Tempe 2044	55	50	P	50	46	58	54	50	46	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0172.01	NCA03	1	330176	6244659	Residential		34 Barden Street Tempe 2044	55	50	P	51	47	55	51	51	48	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0173.01	NCA03	1	330018	6244658	Residential		846-854 Princes Highway Tempe 2044	55	50	P	52	48	54	51	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0174.01	NCA03	1	330119	6244658	Residential		49 Fanning Street Tempe 2044	55	50	P	52	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0175.01	NCA03	1	330184	6244658	Residential		32 Barden Street Tempe 2044	55	50	P	51	48	55	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0176.01	NCA03	1	330234	6244657	Residential		19 Barden Street Tempe 2044	55	50	P	50	46	56	52	50	47	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0177.01	NCA03	1	330300	6244656	Residential		8 Smith Street Tempe 2044	55	50	P	49	46	58	54	50	46	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0181.01	NCA03	1	330189	6244650	Residential		30 Barden Street Tempe 2044	55	50	P	50	46	55	51	50	47	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0183.01	NCA03	1	330306	6244650	Residential		6 Smith Street Tempe 2044	55	50	P	48	44	61	57	49	45	61	58	Y	Y	Y	Y	-	-	Y

Name	NCA	Flr	Easting	Northing	RecType	Name	Address	NCG Criteria		Period	Predicted Noise Level (dBA)								> 2 dB(A) Increase		Cumulative Limit		Project Acute		Eligible for Consideration of Mitigation
											At Opening (2026)				Future Design (2036)										
											No Build		Build		No Build		Build								
								D	N		D	N	D	N	D	N	D	N	D	N	D	N	D	N	
NCA03.RES.0184.01	NCA03	1	330238	6244648	Residential		17 Barden Street Tempe 2044	55	50	P	52	48	56	53	52	48	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0187.01	NCA03	1	330134	6244646	Residential		33 Fanning Street Tempe 2044	55	50	P	51	47	54	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0187.01	NCA03	2	330134	6244646	Residential		33 Fanning Street Tempe 2044	55	50	P	52	49	56	52	53	49	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0188.01	NCA03	1	330196	6244645	Residential		28 Barden Street Tempe 2044	55	50	P	51	47	55	51	51	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0189.01	NCA03	1	330248	6244643	Residential		11 Barden Street Tempe 2044	55	50	P	51	47	56	52	51	47	56	53	Y	Y	-	-	-	-	Y
NCA03.RES.0190.01	NCA03	1	330028	6244641	Residential		45 Wentworth Street Tempe 2044	55	50	P	52	48	54	50	52	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0193.01	NCA03	1	330257	6244640	Residential		9 Barden Street Tempe 2044	55	50	P	50	46	58	54	50	47	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0196.01	NCA03	1	330203	6244635	Residential		22 Barden Street Tempe 2044	55	50	P	51	47	55	51	51	48	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0197.01	NCA03	1	330214	6244635	Residential		20 Barden Street Tempe 2044	55	50	P	50	46	55	51	51	47	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0198.01	NCA03	1	330147	6244635	Residential		29 Fanning Street Tempe 2044	55	50	P	52	48	54	50	53	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0198.01	NCA03	2	330147	6244635	Residential		29 Fanning Street Tempe 2044	55	50	P	52	48	57	53	52	48	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0200.01	NCA03	2	330034	6244632	Residential		43 Wentworth Street Tempe 2044	55	50	P	54	50	57	53	54	51	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0204.01	NCA03	1	330260	6244629	Residential		7 Barden Street Tempe 2044	55	50	P	48	45	56	53	49	45	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0204.01	NCA03	2	330260	6244629	Residential		7 Barden Street Tempe 2044	55	50	P	50	46	59	55	51	47	60	56	Y	Y	Y	Y	-	-	Y
NCA03.RES.0207.01	NCA03	1	330219	6244627	Residential		18 Barden Street Tempe 2044	55	50	P	50	46	56	52	50	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0208.01	NCA03	1	330269	6244625	Residential		5 Barden Street Tempe 2044	55	50	P	49	45	56	52	49	46	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0214.01	NCA03	1	330227	6244621	Residential		10 Barden Street Tempe 2044	55	50	P	50	46	56	52	50	47	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0217.01	NCA03	1	330278	6244619	Residential		3 Barden Street Tempe 2044	55	50	P	49	45	60	56	49	46	60	56	Y	Y	Y	Y	-	-	Y
NCA03.RES.0218.01	NCA03	1	330161	6244619	Residential		21 Fanning Street Tempe 2044	55	50	P	51	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0220.01	NCA03	1	330170	6244618	Residential		19 Fanning Street Tempe 2044	55	50	P	52	48	55	51	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0223.01	NCA03	1	330118	6244616	Residential		46 Fanning Street Tempe 2044	55	50	P	52	48	54	51	52	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0230.01	NCA03	1	330128	6244613	Residential		44 Fanning Street Tempe 2044	55	50	P	52	48	55	51	52	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0231.01	NCA03	1	330233	6244612	Residential		8 Barden Street Tempe 2044	55	50	P	50	46	56	52	50	46	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0232.01	NCA03	1	330180	6244612	Residential		17 Fanning Street Tempe 2044	55	50	P	50	46	55	51	51	47	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0233.01	NCA03	1	330243	6244610	Residential		6 Barden Street Tempe 2044	55	50	P	50	46	57	53	50	46	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0234.01	NCA03	1	330292	6244610	Residential		1 Barden Street Tempe 2044	55	50	P	49	45	60	57	49	46	61	57	Y	Y	Y	Y	-	-	Y
NCA03.RES.0241.01	NCA03	1	330134	6244605	Residential		42 Fanning Street Tempe 2044	55	50	P	51	48	55	51	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0243.01	NCA03	1	330249	6244604	Residential		4 Barden Street Tempe 2044	55	50	P	49	45	57	53	50	46	57	54	Y	Y	-	-	-	-	Y
NCA03.RES.0245.01	NCA03	1	330187	6244604	Residential		15 Fanning Street Tempe 2044	55	50	P	51	47	54	51	51	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0249.01	NCA03	1	330196	6244599	Residential		11 Fanning Street Tempe 2044	55	50	P	50	46	55	51	50	46	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0251.01	NCA03	1	330141	6244598	Residential		28 Fanning Street Tempe 2044	55	50	P	52	48	55	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0256.01	NCA03	1	330256	6244596	Residential		2 Barden Street Tempe 2044	55	50	P	48	44	57	53	48	45	58	54	Y	Y	-	-	-	-	Y
NCA03.RES.0259.01	NCA03	1	330200	6244592	Residential		9 Fanning Street Tempe 2044	55	50	P	49	45	54	50	49	46	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0262.01	NCA03	1	330146	6244590	Residential		26 Fanning Street Tempe 2044	55	50	P	51	47	54	50	51	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0265.01	NCA03	1	330157	6244588	Residential		24 Fanning Street Tempe 2044	55	50	P	51	47	55	51	51	47	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0267.01	NCA03	1	330207	6244586	Residential		7 Fanning Street Tempe 2044	55	50	P	49	45	54	50	49	46	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0268.01	NCA03	1	330102	6244585	Residential		27 Wentworth Street Tempe 2044	55	50	P	51	47	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0272.01	NCA03	1	329996	6244580	Residential		61 Hart Street Tempe 2044	55	50	P	52	48	54	50	53	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0273.01	NCA03	1	330215	6244580	Residential		5 Fanning Street Tempe 2044	55	50	P	49	45	54	50	49	45	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0273.01	NCA03	2	330215	6244580	Residential		5 Fanning Street Tempe 2044	55	50	P	50	46	58	54	50	47	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0274.01	NCA03	1	330279	6244580	Residential		7 South Street Tempe 2044	55	50	P	48	44	59	55	49	45	59	56	Y	Y	-	Y	-	-	Y
NCA03.RES.0274.01	NCA03	2	330279	6244580	Residential		7 South Street Tempe 2044	55	50	P	51	47	62	58	51	48	62	58	Y	Y	Y	Y	-	-	Y
NCA03.RES.0275.01	NCA03	1	330162	6244579	Residential		22 Fanning Street Tempe 2044	55	50	P	51	47	55	51	51	47	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0278.01	NCA03	1	330111	6244578	Residential		25 Wentworth Street Tempe 2044	55	50	P	51	47	54	50	51	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0280.01	NCA03	1	330223	6244574	Residential		3 Fanning Street Tempe 2044	55	50	P	49	45	54	51	49	46	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0281.01	NCA03	1	330170	6244573	Residential		14 Fanning Street Tempe 2044	55	50	P	51	47	55	51	51	47	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0284.01	NCA03	1	330272	6244573	Residential		5 South Street Tempe 2044	55	50	P	48	44	58	54	49	45	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0287.01	NCA03	1	330117	6244569	Residential		23 Wentworth Street Tempe 2044	55	50	P	50	46	54	50	50	46	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0288.01	NCA03	1	330176	6244569	Residential		12 Fanning Street Tempe 2044	55	50	P	51	47	55	51	51	47	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0289.01	NCA03	1	330231	6244569	Residential		1 Fanning Street Tempe 2044	55	50	P	49	45	55	51	50	46	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0292.01	NCA03	2	330062	6244568	Residential		30 Wentworth Street Tempe 2044	55	50	P	53	49	56	52	53	49	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0296.01	NCA03	1	330179	6244565	Residential		10 Fanning Street Tempe 2044	55	50	P	50	46	55	51	50	47	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0297.01	NCA03	1	330264	6244565	Residential		3 South Street Tempe 2044	55	50	P	48	45	57	53	49	45	58	54	Y	Y	-	-	-	-	Y
NCA03.RES.0298.01	NCA03	1	330295	6244564	Residential		7 South Street Tempe 2044	55	50	P	49	45	58	55	49	46	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0300.01	NCA03	1	330123	6244564	Residential		21 Wentworth Street Tempe 2044	55	50	P	50	46	54	50	50	47	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0302.01	NCA03	1	330185	6244562	Residential		8 Fanning Street Tempe 2044	55	50	P	50	46	55	51	50	46	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0303.01	NCA03	2	330017	6244561	Residential		55 Hart Street Tempe 2044	55	50	P	53	49	55	52	53	49	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0307.01	NCA03	1	330257	6244558	Residential		1 South Street Tempe 2044	55	50	P	48	45	58	54	49	45	58	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0308.01	NCA03	1	330194	6244558	Residential		6 Fanning Street Tempe 2044	55	50	P	50	46	55	51	50	46	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0315.01	NCA03	1	330285	6244553	Residential		3 South Street Tempe 2044	55	50	P	48	45	58	54	49	45	59	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0316.01	NCA03	1	330139	6244553	Residential		15-17 Wentworth Street Tempe 2044	55	50	P	49	45	54	50	49	46	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0316.01	NCA03	2	330139	6244553	Residential		15-17 Wentworth Street Tempe 2044	55	50	P	51	47	56	53	51	47	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0321.01	NCA03	1	330096	6244549	Residential		22 Wentworth Street Tempe 2044	55	50	P	52	48	54	50	52	49	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0322.01	NCA03	1	330198	6244548	Residential		4 Fanning Street Tempe 2044	55	50	P	50	46	56	52	50	46	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0324.01	NCA03	1	330209	6244547	Residential		2 Fanning Street Tempe 2044	55	50	P	49	46	57	53	50	46	58	54	Y	Y	-	-	-	-	Y
NCA03.RES.0329.01	NCA03	2	330038	6244541	Residential		45 Hart Street Tempe 2044	55	50	P	52	48	55	51	52	48	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0330.01	NCA03	1	330103	6244539	Residential		20 Wentworth Street Tempe 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0330.01	NCA03	2	330103	6244539	Residential		20 Wentworth Street Tempe 2044	55	50	P	53	49	56	52	53	50	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0331.01	NCA03	1	330151	6244539	Residential		13 Wentworth Street Tempe 2044	55	50	P	49	45	54	50	49	46	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0338.01	NCA03	1	330160	6244535	Residential		11 Wentworth Street Tempe 2044	55	50	P	50	46	56	52	50	46	56	53	Y	Y	-	-	-	-	Y
NCA03.RES.0342.01	NCA03	1	330107	6244532	Residential		18 Wentworth Street Tempe 2044	55	50	P	51	48	54	50	52	48	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0346.01	NCA03	1	330166	6244526	Residential		9 Wentworth Street Tempe 2044	55	50	P	49	45	56	53	49	46	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0351.01	NCA03	1	330111	6244522	Residential		16 Wentworth Street Tempe 2044	55	50	P	51	47	54	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0353.01	NCA03	1	330172	6244520	Residential		7 Wentworth Street Tempe 2044	55	50	P	48	44	55	51	49	45	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0358.01	NCA03	1	330130	6244517	Residential		14 Wentworth Street Tempe 2044	55	50	P	50	47	54	50	51	47	55	51	-	Y	-	-	-	-	Y

Name	NCA	Flr	Easting	Northing	RecType	Name	Address	NCG Criteria D	NCG Criteria N	Period	Predicted Noise Level (dBA) At Opening (2026) No Build D	At Opening (2026) No Build N	At Opening (2026) Build D	At Opening (2026) Build N	Future Design (2036) No Build D	Future Design (2036) No Build N	Future Design (2036) Build D	Future Design (2036) Build N	> 2 dB(A) Increase D	> 2 dB(A) Increase N	Cumulative Limit D	Cumulative Limit N	Project Acute D	Project Acute N	Eligible for Consideration of Mitigation
NCA03.RES.0360.01	NCA03	1	330180	6244514	Residential		5 Wentworth Street Tempe 2044	55	50	P	50	46	57	53	50	47	58	54	Y	Y	-	-	-	-	Y
NCA03.RES.0364.01	NCA03	1	330139	6244512	Residential		12 Wentworth Street Tempe 2044	55	50	P	50	46	54	51	50	47	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0372.01	NCA03	1	330146	6244506	Residential		10 Wentworth Street Tempe 2044	55	50	P	50	47	55	51	51	47	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0379.01	NCA03	1	330152	6244499	Residential		8 Wentworth Street Tempe 2044	55	50	P	50	46	55	51	50	46	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0382.01	NCA03	1	330162	6244495	Residential		6 Wentworth Street Tempe 2044	55	50	P	50	46	57	53	50	47	58	54	Y	Y	-	-	-	-	Y
NCA03.RES.0384.01	NCA03	1	329981	6244494	Residential		29 Station Street Tempe 2044	55	50	P	52	48	54	50	52	48	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0390.01	NCA03	1	330105	6244486	Residential		9 Hart Street Tempe 2044	55	50	P	50	46	54	50	51	47	54	51	-	Y	-	-	-	-	Y
NCA03.RES.0399.01	NCA03	1	330122	6244478	Residential		5 Hart Street Tempe 2044	55	50	P	50	46	55	51	50	46	55	52	-	Y	-	-	-	-	Y
NCA03.RES.0408.01	NCA03	1	330126	6244470	Residential		3 Hart Street Tempe 2044	55	50	P	49	45	55	51	49	45	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0413.01	NCA03	1	330133	6244463	Residential		1 Hart Street Tempe 2044	55	50	P	50	46	56	52	51	47	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0426.01	NCA03	1	330105	6244448	Residential		4 Hart Street Tempe 2044	55	50	P	50	46	54	50	50	47	55	51	-	Y	-	-	-	-	Y
NCA03.RES.0429.01	NCA03	2	329988	6244446	Residential		20 Station Street Tempe 2044	55	50	P	53	50	56	52	54	50	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0435.01	NCA03	1	330112	6244441	Residential		2 Hart Street Tempe 2044	55	50	P	52	48	56	53	53	49	57	53	Y	Y	-	-	-	-	Y
NCA03.RES.0446.01	NCA03	2	330012	6244429	Residential		16 Station Street Tempe 2044	55	50	P	53	49	55	51	53	49	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0447.01	NCA03	1	330132	6244425	Residential		43 South Street Tempe 2044	55	50	P	49	46	55	51	50	46	56	52	Y	Y	-	-	-	-	Y
NCA03.RES.0452.01	NCA03	2	330080	6244419	Residential		3 Station Street Tempe 2044	55	50	P	52	48	56	52	52	48	56	53	Y	Y	-	-	-	-	Y
NCA03.RES.0456.01	NCA03	1	330086	6244413	Residential		1 Station Street Tempe 2044	55	50	P	52	48	56	52	53	49	56	53	Y	Y	-	-	-	-	Y
NCA03.RES.0456.01	NCA03	2	330086	6244413	Residential		1 Station Street Tempe 2044	55	50	P	55	51	58	54	56	52	58	55	Y	Y	-	Y	-	-	Y
NCA03.RES.0469.01	NCA03	1	330064	6244387	Residential		2 Station Street Tempe 2044	55	50	P	52	48	55	51	53	49	56	52	Y	Y	-	-	-	-	Y
NCA06.OCC.0032.01	NCA06	1	332230	6244737	Other (Childcare)	Aero Kids Early Learning Centre	247 Coward Street Mascot 2020	45	-	H	54	53	54	51	55	54	54	52	Y	-	Y	-	-	-	Y
NCA06.OCC.0032.01	NCA06	2	332230	6244737	Other (Childcare)	Aero Kids Early Learning Centre	247 Coward Street Mascot 2020	45	-	H	56	54	56	53	56	55	56	54	Y	-	Y	-	-	-	Y
NCA06.OCC.0032.01	NCA06	3	332230	6244737	Other (Childcare)	Aero Kids Early Learning Centre	247 Coward Street Mascot 2020	45	-	H	57	55	57	55	57	56	58	55	Y	-	Y	-	-	-	Y
NCA06.OCC.0032.01	NCA06	4	332230	6244737	Other (Childcare)	Aero Kids Early Learning Centre	247 Coward Street Mascot 2020	45	-	H	58	56	58	56	58	57	59	57	Y	-	Y	-	-	-	Y
NCA06.OCC.0032.01	NCA06	5	332230	6244737	Other (Childcare)	Aero Kids Early Learning Centre	247 Coward Street Mascot 2020	45	-	H	59	57	59	57	59	58	60	58	Y	-	Y	-	-	-	Y
NCA06.OHO.0091.01	NCA06	1	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	74	71	72	68	74	72	73	68	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	2	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	74	71	72	68	74	72	73	68	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	3	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	72	69	72	69	72	70	73	69	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	4	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	72	69	72	69	72	70	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	5	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	72	69	72	69	72	69	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	6	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	71	69	72	69	72	69	73	69	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	7	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	71	68	72	68	72	69	73	69	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	8	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	71	67	73	69	71	68	74	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	9	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	71	67	72	69	71	68	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	10	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	72	69	71	68	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	11	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	72	69	71	68	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	12	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	72	68	71	68	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	13	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	72	68	71	68	73	70	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	14	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	72	68	71	67	73	69	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	15	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	71	68	70	67	72	69	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0091.01	NCA06	16	332288	6243995	Other (Hotel)	Stamford Plaza Sydney Airport	Cnr Of Robey Street & O'Riordan Street, Mascot 2020	60	55	P	70	67	71	68	70	67	72	69	-	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	3	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	59	55	62	58	59	56	63	60	Y	Y	-	Y	-	Y	Y
NCA06.OHO.0108.01	NCA06	4	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	60	56	62	59	60	57	63	61	Y	Y	-	Y	-	Y	Y
NCA06.OHO.0108.01	NCA06	5	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	60	57	63	59	61	58	64	61	Y	Y	-	Y	-	Y	Y
NCA06.OHO.0108.01	NCA06	6	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	61	58	63	60	62	58	65	62	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	7	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	62	58	64	60	62	59	65	62	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	8	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	62	59	64	61	63	60	65	62	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	9	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	63	59	65	61	63	60	66	63	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	10	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	63	60	65	62	64	60	66	63	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	11	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	64	60	66	62	64	61	66	63	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	12	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	64	61	66	62	65	61	67	64	Y	Y	Y	Y	Y	Y	Y
NCA06.OHO.0108.01	NCA06	13	332305	6244339	Other (Hotel)	Travelodge	289 King Street, Mascot 2020	60	55	P	64	61	66	62	65	62	67	64	Y	Y	Y	Y	Y	Y	Y
NCA06.OOP.0116.01	NCA06	1	332213	6244048	Other (Outdoor Passive)	Coleman Reserve	4 Coleman Street, Mascot 2020L	55	-	P	66	63	66	62	67	64	66	63	-	-	Y	-	Y	-	Y
NCA06.RES.0115.01	NCA06	3	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	55	51	58	55	55	52	59	56	-	Y	-	-	-	-	Y
NCA06.RES.0115.01	NCA06	4	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	56	53	59	56	56	53	60	57	-	Y	-	-	-	-	Y
NCA06.RES.0115.01	NCA06	5	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	57	54	61	57	58	55	62	59	Y	Y	-	-	-	-	Y
NCA06.RES.0115.01	NCA06	6	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	59	55	62	58	59	56	63	60	Y	Y	-	Y	-	Y	Y
NCA06.RES.0115.01	NCA06	7	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	60	57	63	59	60	57	64	61	Y	Y	-	Y	-	Y	Y
NCA06.RES.0115.01	NCA06	8	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	61	57	63	60	61	58	64	61	Y	Y	-	Y	-	Y	Y
NCA06.RES.0115.01	NCA06	9	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	61	58	64	60	62	59	65	62	Y	Y	Y	Y	Y	Y	Y
NCA06.RES.0115.01	NCA06	10	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	62	59	64	61	63	59	66	63	Y	Y	Y	Y	Y	Y	Y
NCA06.RES.0115.01	NCA06	11	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	63	60	65	61	63	60	66	63	Y	Y	Y	Y	Y	Y	Y
NCA06.RES.0115.01	NCA06	12	332326	6244270	Residential	King Apartments	338 King Street Mascot 2020	60	55	P	63	60	65	62	64	61	67	63	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0028.01	NCA07	1	332479	6243819	Other (Hotel)	Ibis Budget Sydney Airport	5 Ross Smith Avenue, Mascot 2020	60	55	P	73	70	75	72	74	71	76	73	Y	Y	-	-	-	-	Y
NCA07.OHO.0028.01	NCA07	2	332479	6243819	Other (Hotel)	Ibis Budget Sydney Airport	5 Ross Smith Avenue, Mascot 2020	60	55	P	74	71	76	73	75	72	77	74	Y	Y	-	-	-	-	Y
NCA07.OHO.0028.01	NCA07	3	332479	6243819	Other (Hotel)	Ibis Budget Sydney Airport	5 Ross Smith Avenue, Mascot 2020	60	55	P	75	71	76	73	75	72	77	74	Y	Y	-	-	-	Y	Y
NCA07.OHO.0028.01	NCA07	4	332479	6243819	Other (Hotel)	Ibis Budget Sydney Airport	5 Ross Smith Avenue, Mascot 2020	60	55	P	74	71	76	73	75	72	77	74	Y	Y	-	-	-	Y	Y
NCA07.OHO.0028.01	NCA07	5	332479	6243819	Other (Hotel)	Ibis Budget Sydney Airport	5 Ross Smith Avenue, Mascot 2020	60	55	P	74	71	76	72	74	71	76	74	Y	Y	-	-	-	Y	Y
NCA07.OHO.0075.01	NCA07	1	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	74	70	75	72	74	71	76	73	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	2	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	75	71	76	73	75	72	77	74	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	3	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	74	71	76	73	75	72	77	74	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	4	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	74	71	76	73	74	71	77	74	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	5	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	74	71	76	72	74	71	76	74	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	6	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	74	70	75	72	74	71	76	73	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	7	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	73	70	75	72	74	71	76	73	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	8	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	73	70	75	72	73	70	76	73	Y	Y	-	-	Y	Y	Y

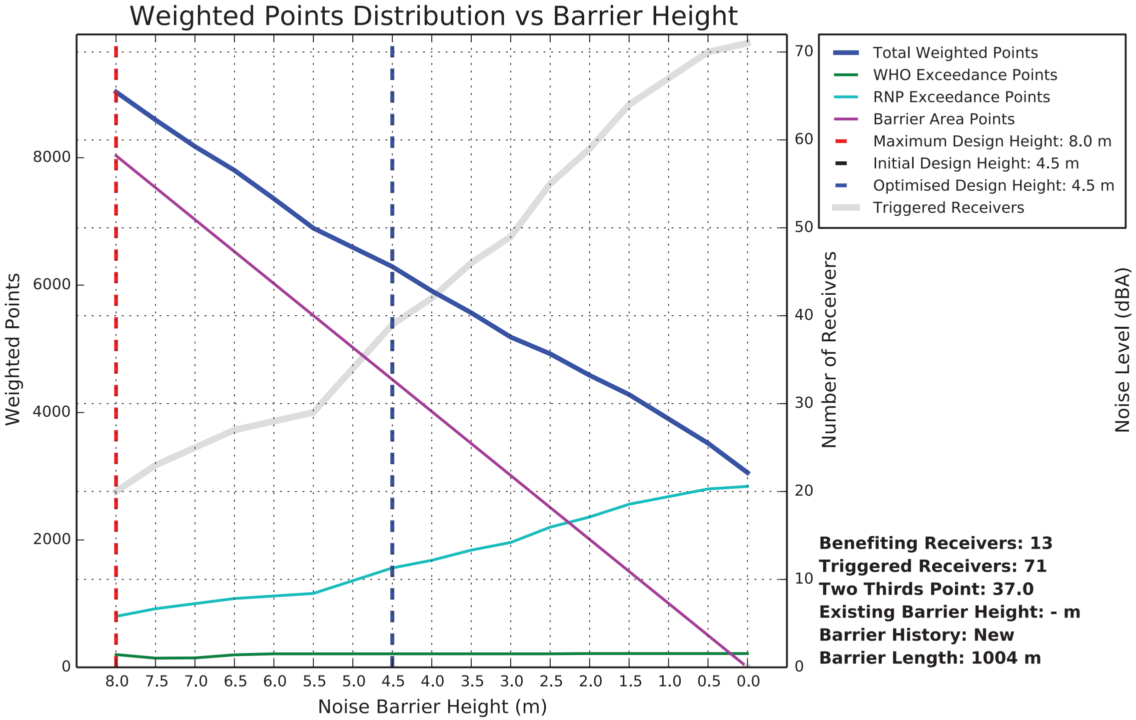
Name	NCA	Flr	Easting	Northing	RecType	Name	Address	NCG Criteria		Period	Predicted Noise Level (dBA)								> 2 dB(A) Increase		Cumulative Limit		Project Acute		Eligible for Consideration of Mitigation
											At Opening (2026)				Future Design (2036)										
											No Build		Build		No Build		Build								
								D	N		D	N	D	N	D	N	D	N	D	N	D	N	D	N	
NCA07.OHO.0075.01	NCA07	9	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	73	69	75	71	73	70	75	73	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0075.01	NCA07	10	332438	6243830	Other (Hotel)	Mantra Hotel	3 Ross Smith Avenue, Mascot 2020	60	55	P	73	69	74	71	73	70	75	72	Y	Y	-	-	Y	Y	Y
NCA07.OHO.0076.01	NCA07	1	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	72	69	74	71	73	70	75	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	2	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	73	70	75	71	73	71	76	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	3	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	74	71	76	72	74	71	77	74	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	4	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	73	70	75	71	74	71	76	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	5	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	73	70	75	72	74	71	76	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	6	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	73	70	75	72	74	71	76	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	7	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	73	70	75	72	74	71	76	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	8	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	73	70	75	71	73	70	76	73	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	9	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	72	69	74	71	73	70	75	72	Y	Y	Y	Y	Y	Y	Y
NCA07.OHO.0076.01	NCA07	10	332195	6243901	Other (Hotel)	Future Airport Hotel	Future Airport Hotel	60	55	P	72	69	74	71	73	70	75	72	Y	Y	Y	Y	Y	Y	Y
NCA08.OHO.0314.01	NCA08	6	332450	6244009	Other (Hotel)	Quest Mascot (Hotel)	108-114 Robey Street, Mascot 2020	60	55	P	68	65	68	64	69	66	69	65	-	-	-	-	-	Y	Y
NCA08.OHO.0314.01	NCA08	7	332450	6244009	Other (Hotel)	Quest Mascot (Hotel)	108-114 Robey Street, Mascot 2020	60	55	P	68	65	68	65	69	66	69	65	-	-	-	-	-	Y	Y
NCA08.OHO.0314.01	NCA08	8	332450	6244009	Other (Hotel)	Quest Mascot (Hotel)	108-114 Robey Street, Mascot 2020	60	55	P	68	66	68	65	69	66	69	65	-	-	-	-	-	Y	Y
NCA08.OHO.0314.01	NCA08	9	332450	6244009	Other (Hotel)	Quest Mascot (Hotel)	108-114 Robey Street, Mascot 2020	60	55	P	68	66	69	65	69	66	69	66	-	-	-	-	-	Y	Y
NCA08.OHO.0314.01	NCA08	10	332450	6244009	Other (Hotel)	Quest Mascot (Hotel)	108-114 Robey Street, Mascot 2020	60	55	P	69	66	69	65	69	66	69	66	-	-	-	-	-	Y	Y
NCA08.OHO.0421.01	NCA08	1	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	60	57	62	59	60	57	63	61	Y	Y	-	-	-	-	Y
NCA08.OHO.0421.01	NCA08	2	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	63	60	65	62	63	60	66	63	Y	Y	-	-	-	-	Y
NCA08.OHO.0421.01	NCA08	3	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	64	61	67	63	65	62	67	65	Y	Y	-	-	-	-	Y
NCA08.OHO.0421.01	NCA08	4	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	66	62	68	64	66	63	68	66	Y	Y	-	-	-	-	Y
NCA08.OHO.0421.01	NCA08	5	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	66	63	68	65	67	63	69	66	Y	Y	-	-	-	-	Y
NCA08.OHO.0421.01	NCA08	6	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	67	63	69	65	67	64	69	67	Y	Y	-	-	-	-	Y
NCA08.OHO.0421.01	NCA08	7	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	67	64	69	66	67	64	70	67	Y	Y	-	-	-	Y	Y
NCA08.OHO.0421.01	NCA08	8	332479	6243981	Other (Hotel)	Citadines Connect Sydney Airport	121 Baxter Road, Mascot 2020	60	55	P	67	64	69	66	67	64	70	67	Y	Y	-	-	-	Y	Y
NCA08.RES.0345.01	NCA08	1	332426	6243975	Residential		131 Baxter Road Mascot 2020	60	55	P	56	53	58	55	57	54	59	56	-	Y	-	-	-	-	Y
NCA08.RES.0353.01	NCA08	1	332540	6243966	Residential		107 Baxter Road Mascot 2020	60	55	P	59	56	62	58	60	57	63	60	Y	Y	-	-	-	-	Y
NCA08.RES.0353.01	NCA08	2	332540	6243966	Residential		107 Baxter Road Mascot 2020	60	55	P	62	59	65	61	63	60	65	63	Y	Y	-	-	-	-	Y
NCA08.RES.0355.01	NCA08	1	332561	6243963	Residential		103 Baxter Road Mascot 2020	60	55	P	60	56	62	59	60	57	63	60	Y	Y	-	-	-	-	Y
NCA08.RES.0355.01	NCA08	2	332561	6243963	Residential		103 Baxter Road Mascot 2020	60	55	P	62	59	65	61	63	60	65	63	Y	Y	-	-	-	-	Y
NCA08.RES.0356.01	NCA08	1	332549	6243962	Residential		105 Baxter Road Mascot 2020	60	55	P	60	56	62	59	60	57	63	60	Y	Y	-	-	-	-	Y
NCA08.RES.0357.01	NCA08	1	332530	6243961	Residential		109 Baxter Road Mascot 2020	60	55	P	60	57	63	60	61	58	64	61	Y	Y	-	-	-	-	Y
NCA08.RES.0363.01	NCA08	1	332609	6243954	Residential		93 Baxter Road Mascot 2020	60	55	P	60	56	62	59	60	57	63	60	Y	Y	-	-	-	-	Y
NCA08.RES.0386.01	NCA08	1	332899	6243912	Residential		29 Baxter Road Mascot 2020	60	55	P	58	55	60	57	58	55	61	58	Y	Y	-	-	-	-	Y
NCA08.RES.0386.01	NCA08	2	332899	6243912	Residential		29 Baxter Road Mascot 2020	60	55	P	60	57	62	59	60	57	63	60	Y	Y	-	-	-	-	Y
NCA08.RES.0387.01	NCA08	1	332878	6243911	Residential		33 Baxter Road Mascot 2020	60	55	P	61	58	63	60	61	58	64	61	Y	Y	-	-	-	-	Y
NCA08.RES.0388.01	NCA08	1	332889	6243911	Residential		31 Baxter Road Mascot 2020	60	55	P	60	57	62	59	61	58	63	61	Y	Y	-	-	-	-	Y
NCA08.RES.0389.01	NCA08	1	332929	6243908	Residential		23 Baxter Road Mascot 2020	60	55	P	57	54	59	55	58	55	60	57	-	Y	-	-	-	-	Y
NCA08.RES.0390.01	NCA08	1	332918	6243907	Residential		25 Baxter Road Mascot 2020	60	55	P	57	53	59	56	57	54	60	57	-	Y	-	-	-	-	Y
NCA08.RES.0391.01	NCA08	1	332938	6243905	Residential		21 Baxter Road Mascot 2020	60	55	P	57	54	58	55	57	54	59	56	-	Y	-	-	-	-	Y
NCA08.RES.0391.01	NCA08	2	332938	6243905	Residential		21 Baxter Road Mascot 2020	60	55	P	59	56	61	57	60	56	61	59	-	Y	-	-	-	-	Y
NCA08.RES.0403.01	NCA08	1	332920	6243868	Residential		32 Baxter Road Mascot 2020	60	55	P	60	57	63	60	61	58	64	61	Y	Y	-	-	-	-	Y
NCA08.RES.0403.01	NCA08	2	332920	6243868	Residential		32 Baxter Road Mascot 2020	60	55	P	63	60	65	62	63	60	66	63	Y	Y	-	-	-	-	Y
NCA08.RES.0404.01	NCA08	1	332910	6243866	Residential		34 Baxter Road Mascot 2020	60	55	P	62	58	64	61	62	59	65	62	Y	Y	-	-	-	-	Y
NCA08.RES.0404.01	NCA08	2	332910	6243866	Residential		34 Baxter Road Mascot 2020	60	55	P	64	61	66	63	65	62	67	65	Y	Y	-	-	-	-	Y
NCA08.RES.0405.01	NCA08	1	332929	6243864	Residential		30 Baxter Road Mascot 2020	60	55	P	61	58	64	60	61	58	64	62	Y	Y	-	-	-	-	Y
NCA08.RES.0406.01	NCA08	1	332940	6243862	Residential		28 Baxter Road Mascot 2020	60	55	P	61	57	63	60	61	58	64	61	Y	Y	-	-	-	-	Y
NCA08.RES.0407.01	NCA08	1	332950	6243862	Residential		26 Baxter Road Mascot 2020	60	55	P	58	55	60	57	58	55	61	58	Y	Y	-	-	-	-	Y
NCA08.RES.0408.01	NCA08	1	332961	6243858	Residential		22-24 Baxter Road Mascot 2020	60	55	P	58	55	61	58	59	56	62	59	Y	Y	-	-	-	-	Y
NCA08.RES.0409.01	NCA08	1	332973	6243857	Residential		18-20 Baxter Road Mascot 2020	60	55	P	57	54	59	56	58	55	60	58	-	Y	-	-	-	-	Y
NCA08.RES.0410.01	NCA08	1	332985	6243855	Residential		14-16 Baxter Road Mascot 2020	60	55	P	56	53	58	55	57	54	59	57	-	Y	-	-	-	-	Y
NCA08.RES.0418.01	NCA08	1	332899	6243869	Residential		36 Baxter Road Mascot 2020	60	55	P	62	59	64	61	62	59	65	63	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	1	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	61	58	64	61	62	59	65	62	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	2	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	63	60	66	63	64	61	67	64	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	3	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	64	61	67	64	65	62	68	65	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	4	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	66	62	68	65	66	63	69	66	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	5	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	66	63	68	65	67	63	69	66	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	6	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	67	63	69	65	67	64	70	67	Y	Y	-	-	-	-	Y
NCA08.RES.0420.01	NCA08	7	332754	6243935	Residential		59 Baxter Road Mascot 2020	60	55	P	67	64	69	66	67	64	70	67	Y	Y	-	-	-	-	Y
																								Total	359

Note: The results in this table are based on the highest noise level of the triggered facades, per floor. If no facades are triggered, then the highest noise level of all facades is presented for each floor. It is noted that a single receiver may be triggered on multiple facades by different criteria and for some receivers where a >2 dB increase is shown, the increase may be on a different facade from where the highest noise level is predicted.

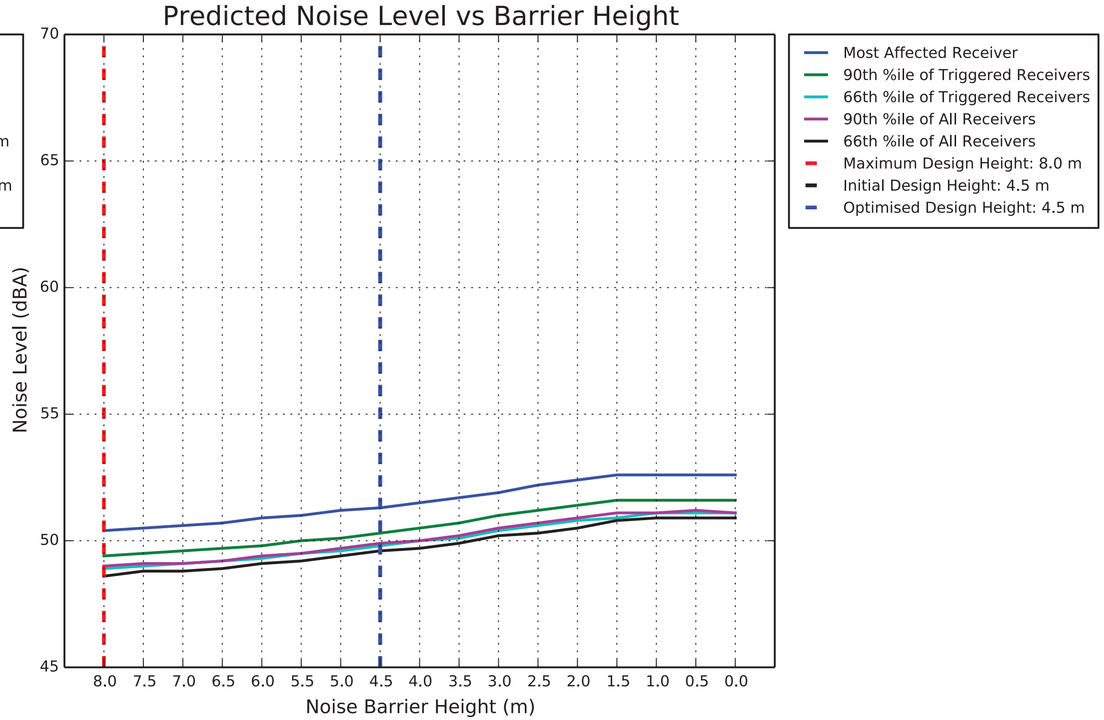
Note: Address information has been taken from third party data. Reference should be made to the exceedance maps for the location of all triggered buildings.

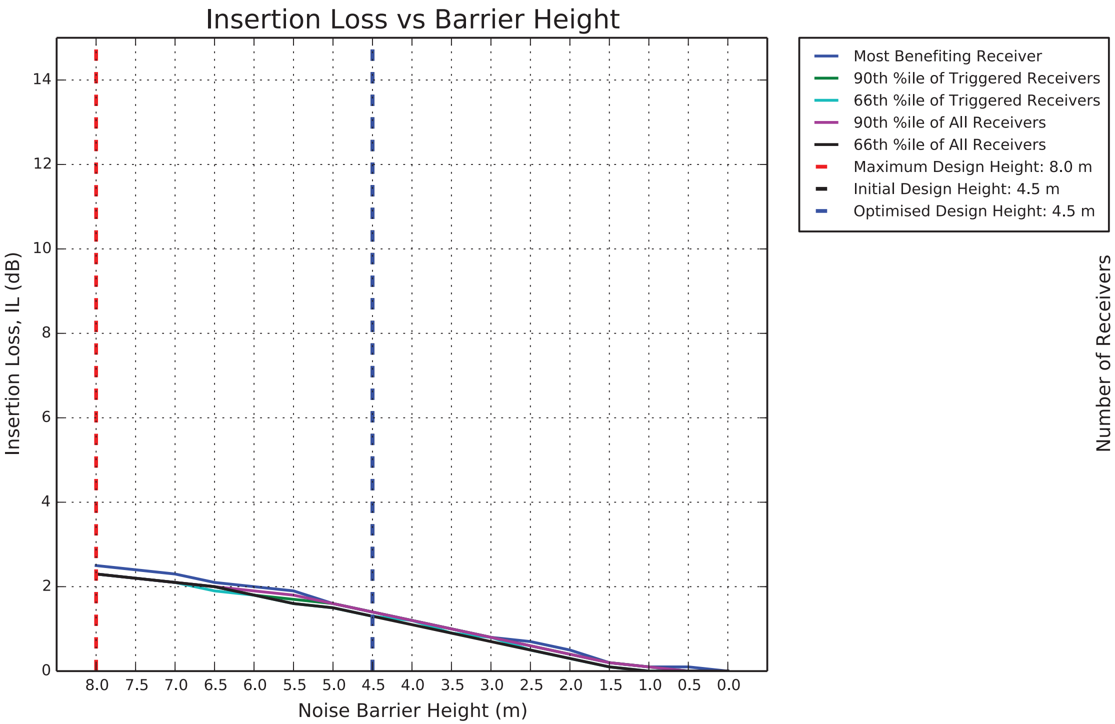
Noise Barrier Optimisation Graphs

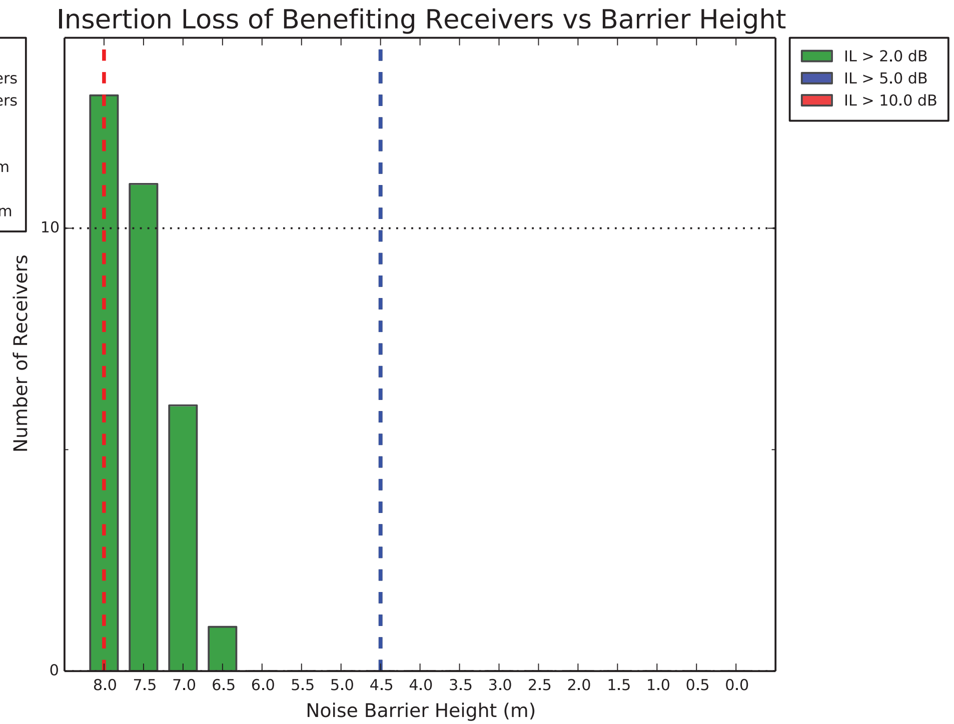
Noise Barrier Optimisation: NW01



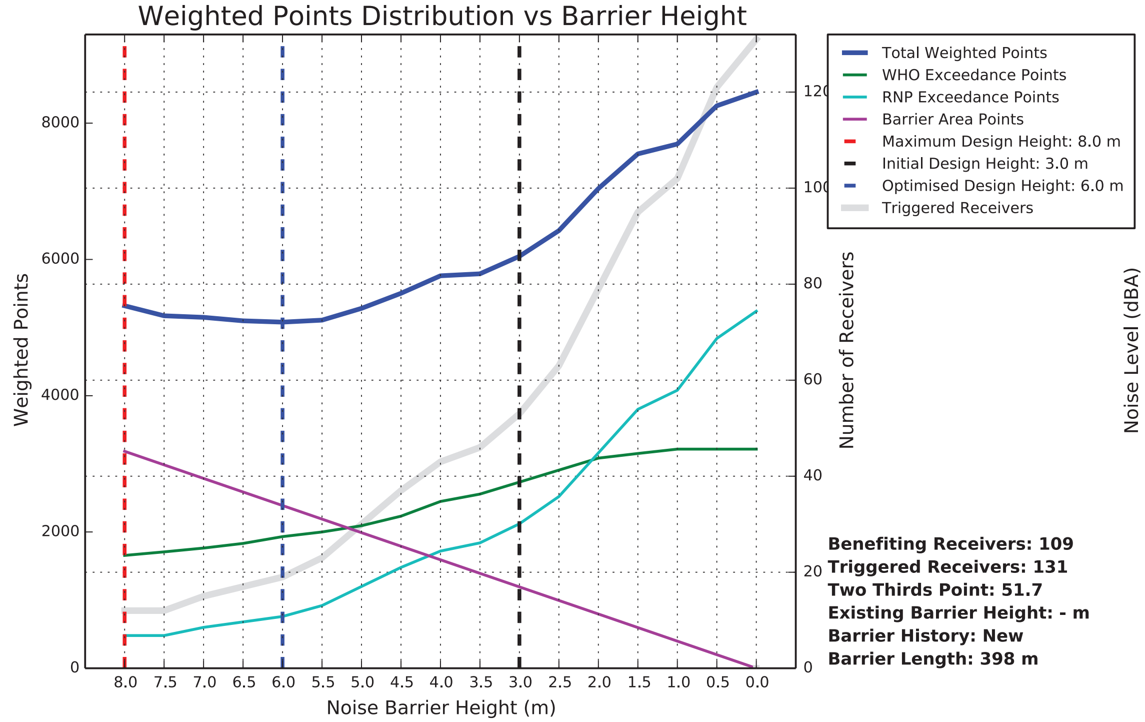
Benefiting Receivers: 13
Triggered Receivers: 71
Two Thirds Point: 37.0
Existing Barrier Height: - m
Barrier History: New
Barrier Length: 1004 m



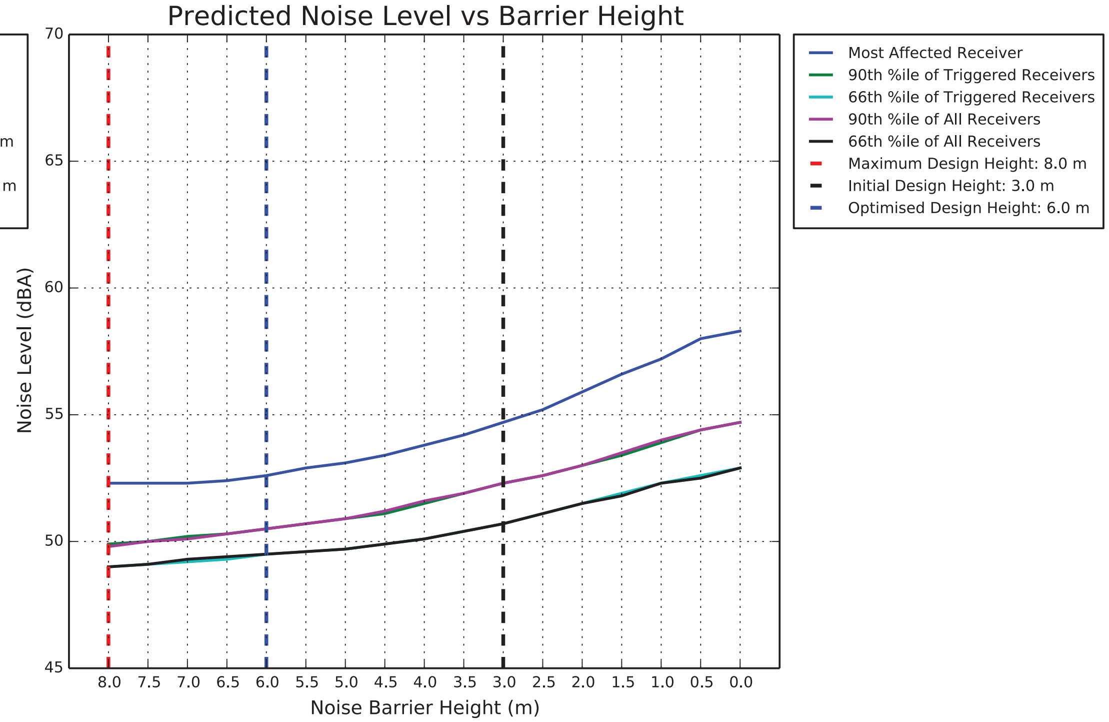


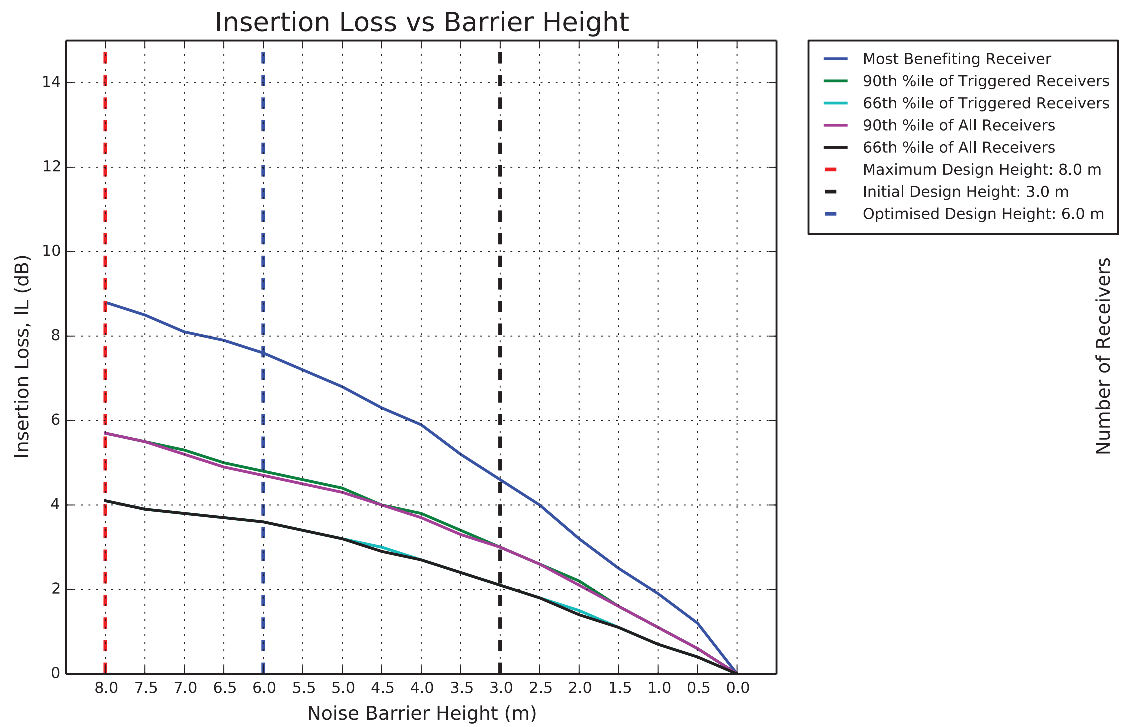


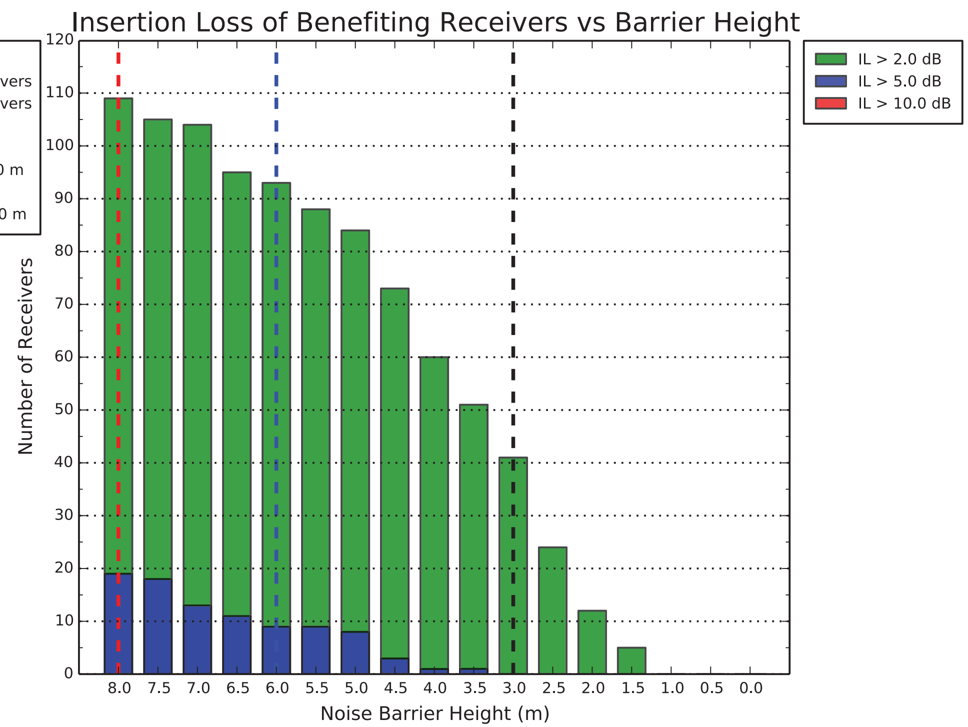
Noise Barrier Optimisation: NW02



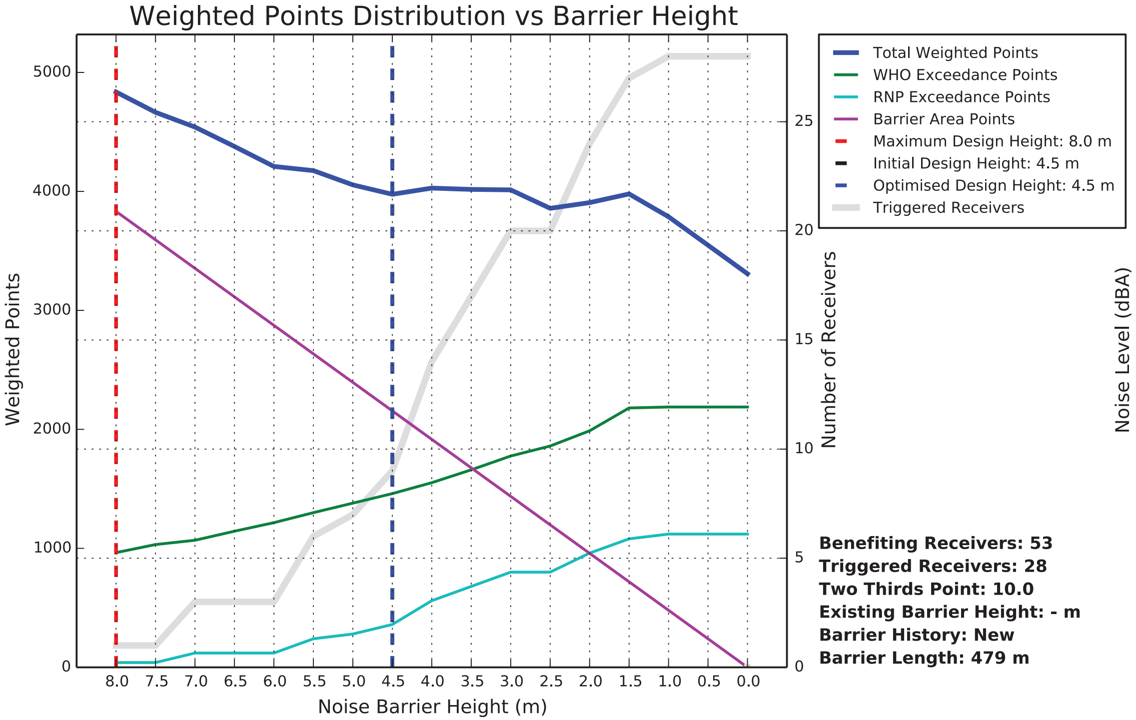
Benefiting Receivers: 109
Triggered Receivers: 131
Two Thirds Point: 51.7
Existing Barrier Height: - m
Barrier History: New
Barrier Length: 398 m



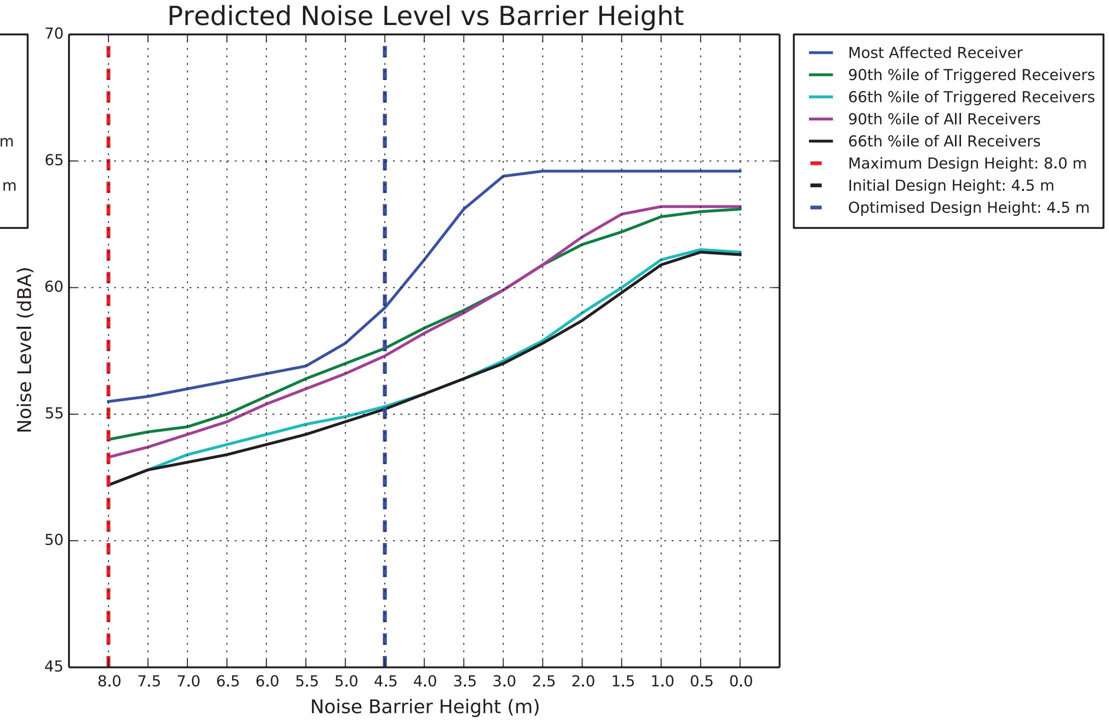


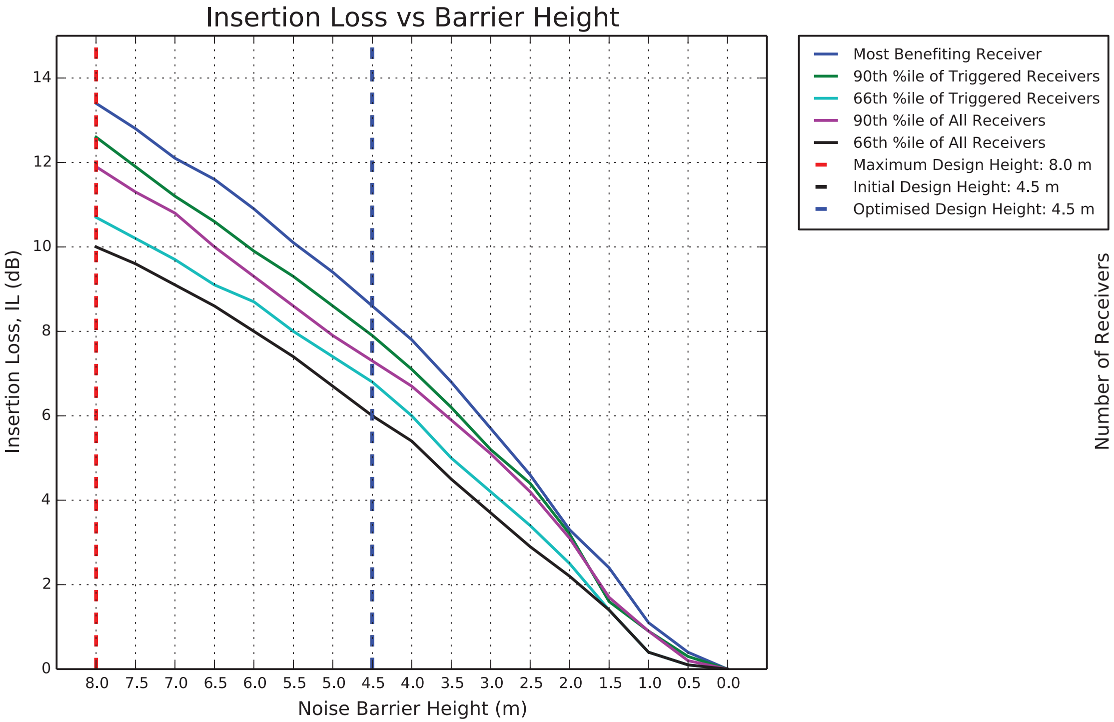


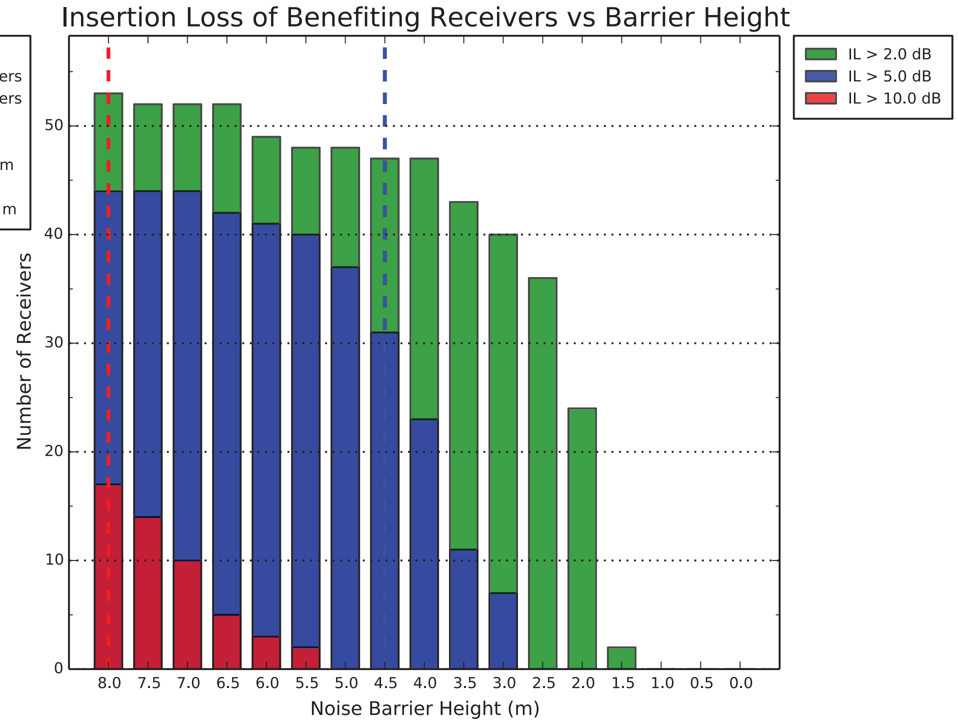
Noise Barrier Optimisation: NW03



Benefiting Receivers: 53
Triggered Receivers: 28
Two Thirds Point: 10.0
Existing Barrier Height: - m
Barrier History: New
Barrier Length: 479 m







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